WORK PLAN

VOLUNTARY CORRECTIVE ACTION PROGRAM PRATT & WHITNEY CONNECTICUT FACILITIES

NOVEMBER 22, 1996

PREPARED BY:

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Comm. No. 68VC601

UNITED TECHNOLOGIES
PRATT&WHITNEY

400 Main Street
East Hartford, Connecticut 06108

November 22, 1996

Mr. Ernest Waterman
U.S. EPA Region I
JFK Federal Building
Mail Code HBT
Boston, MA 02203

Subject: Submittal of Pratt & Whitney's VCAP Work Plan

Dear Mr. Waterman:

Please find enclosed three copies of our Voluntary Corrective Action Workplan.

If you have any questions, please call me at (860) 565-7380. Otherwise, we look forward to seeing you on December 17.

Sincerely yours,

Troy Charlton

Troy J. Charlton
Manager, Remediation Programs

copy: D. Ringquist, CT DEP
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SECTION 1 - INTRODUCTION

On July 17, 1996, Pratt & Whitney and the United States Environmental Protection Agency, Region 1 (EPA-New England) signed a Memorandum of Understanding (MOU) that outlines the principle components of a Voluntary Corrective Action Program (VCAP) that Pratt & Whitney has agreed to undertake at six of its facilities in Connecticut. The Pratt & Whitney sites to be addressed under this program include: 1) East Hartford Main Street - CTD990672081; 2) Colt Street - CTD00844399; 3) Pent Road - CTD000845131; 4) North Haven - CTD001449511; 5) Rocky Hill - CTD000844407; and, 6) Southington Manufacturing - CTD001149277.

Pratt & Whitney's principal objective, as discussed in the MOU, is to have initiated stabilization activities at the six sites in question on or before December 31, 1999. This work plan provides an overview of activities that will be performed in order to meet that milestone.

1.1 Philosophy and Objectives

In order to clearly understand the rationale behind the proposed approach (discussed in more detail in Section 3.0), it is important to outline Pratt & Whitney's understanding of "stabilization" and the scope of the VCAP. A clear understanding of the overall objective will allow Pratt & Whitney to focus its resources on the areas of investigation which will yield the greatest return (i.e., elimination of potential human exposures as quickly and efficiently as possible).

With regard to stabilization, Pratt & Whitney is aware that there are two standards that must be met. Pratt & Whitney must demonstrate that human exposures have been controlled by reducing contaminant levels to below applicable action levels (under an industrial/commercial land use scenario) or by **controlling/eliminating the pathway** through the use of physical barriers or **institutional controls**. Moreover, Pratt & Whitney must control groundwater releases by installing an engineered system or by demonstrating that the remedial measures and/or **natural attenuation** will be effective in controlling groundwater releases. For clarification purposes, Pratt & Whitney would like to expand on a few of the requirements within these two standards.

Controlling/Eliminating the Pathway: It is Pratt & Whitney's intent to eliminate exposure pathways where they exist. However, assessing the exposure pathways and/or determining the degree of stabilization activities that may be required can be addressed, in most cases, without knowing the degree and extent of contamination (i.e., soil contamination) or even if it exists or not. For example, although contaminated soils and/or groundwater may be present beneath a manufacturing facility, an indoor air survey is likely to indicate that air exposures inside the facility do not exceed any applicable OSHA or NIOSH standards; therefore the volatilization pathway can be eliminated from further consideration. The other pathways which may result in worker exposure, direct contact with contaminated soils and/or groundwater during construction activities, can be addressed through the use of institutional controls. Given the scenario just described, Pratt & Whitney's investigation activities inside the building will focus on the identification (through records review) of the manufacturing processes that may have contributed to soil and/or groundwater contamination (i.e., to focus sample analysis and provide key data for the design of institutional controls) and the performance of indoor air surveys.

Institutional Controls: The construction of a fence or the use of other security measures to prevent or limit access to areas of contamination are examples of typical institutional controls. When controlling or eliminating exposure pathways, especially within an operating manufacturing facility, Pratt & Whitney will most likely propose implementing measures that are not typically included within the cadre of institutional controls. For example, in order to ensure that workers are not placed at risk when involved in subsurface work (e.g., excavation), Pratt & Whitney could institute a formal policy that requires that soils be sampled and analyzed prior to the initiation of subsurface excavation work. If contamination is present, measures can be taken to ensure that personnel with the proper training and personal protective equipment are utilized to perform the necessary work.

Natural Attenuation: The primary contaminants likely to be found in the groundwater at Pratt & Whitney sites are Dense Non-Aqueous Phase Liquids (DNAPLs). As the EPA is well aware, the ability of today's groundwater remediation technologies to significantly reduce the volume and/or toxicity of DNAPL contamination, let alone achieve drinking water standards, is highly questionable, even under the most ideal hydrogeologic conditions. Therefore, Pratt & Whitney's groundwater investigation will focus on determining and evaluating the efficacy of groundwater remediation or control systems in preventing human exposures and/or mitigating any further environmental damage. It is possible that, at most of the sites in question, natural attenuation will achieve the stabilization objectives with regard to groundwater. Pratt & Whitney, in cooperation with the University of Connecticut, the University of Waterloo, and the United Technologies Research Center, will continue to evaluate remediation technologies on an ongoing basis through the use of small-scale research projects, such as the one currently being conducted at the Pratt & Whitney North Haven facility. In the event that an effective technology is developed, Pratt & Whitney will evaluate the appropriateness of utilizing the new technology at those sites where additional groundwater remediation is warranted.

In summary, it is Pratt & Whitney's intent to focus on the end goal of stabilization (i.e., controlling/eliminating pathways and mitigating the impact of groundwater releases) when designing the investigation and selecting stabilization methodologies.

1.2 Document Organization

As noted previously, Pratt & Whitney and EPA-New England signed a Memorandum of Understanding (MOU) which outlines the principle components of a Voluntary Corrective Action Program (VCAP) for six Pratt & Whitney facilities in Connecticut. The MOU describes the elements of the VCAP and specifies that a Work Plan, which discusses the activities that will be performed to achieve stabilization, be prepared and submitted within 130 days from the signing of the MOU. The MOU specifies that the Work Plan include the following:

- A summary of the investigation/remediation activities which have occurred at the facilities.
- The methodologies that Pratt & Whitney will utilize to: 1) identify specific units, releases and exposure pathways of concern, using a land use of industrial/commercial; 2) understand the transport and fate of known and potential releases; and 3) identify all actual or potential human receptors.
- A Data Collection Quality Assurance Plan and a Data Quality Objectives Plan.
- A Data Management Plan.
- A Public Involvement Plan.
- A schedule which indicates major milestones and submittal dates.

Each of these items are addressed in various sections of this Work Plan. Section 2 provides an overview of the typical environmental settings and waste management practices applicable to all six sites. Six appendices (A through F) have been prepared in conjunction with this section. These appendices provide, for each site, descriptions of the site, environmental setting, waste management practices, a summary of existing conditions, and identification of environmental units. The term "Environmental Unit" is used to describe potential source areas and includes Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs). This convention will be used throughout the Work Plan and subsequent reports.

Section 3 provides an overview of the methodologies that Pratt & Whitney will employ in designing investigations and stabilization activities under the VCAP.

The Project Management Plan, which includes a schedule indicting major milestones and submittal dates, is presented as Section 4. The Data Management Plan is presented as Section 5, followed by the Data Collection Quality Assurance Plan as Section 6 and the Public Involvement Plan as Section 7.

SECTION 2 - FACILITY DESCRIPTIONS

2.1 Background

The six Pratt & Whitney facilities discussed in this Work Plan are located in: East Hartford (three sites), Rocky Hill, Southington, and North Haven, Connecticut (one site each). Because the general character of the manufacturing work performed at these sites has been similar, all of the sites will be described in general terms. Specific information, descriptions, and discussions of each of the facilities are presented in Appendices A through F.

The three East Hartford facilities, all owned and operated by Pratt & Whitney, are the main plant, located at 400 Main Street; the Colt Street facility; and the Andrew Willgoos Turbine Laboratory on Pent Road. The Main Street facility is located on approximately 1,100 acres of land and has been used for the manufacture of aircraft engines and aircraft engine components since 1929. Operations at the Main Street facility include (or have included in the past) vapor degreasing, chemical etching, electroplating, machining of various metals and alloys, assembly and testing, and research operations on jet engine components and assemblies. The facility also includes an airport and associated operations, as well as a large area (known as the Klondike) of former research and development facilities.

The Colt Street facility is located on approximately 12 acres of land on Colt Street in East Hartford, Connecticut. The site has been used since 1972 for the treatment of dilute wastewater. The facility processes dilute industrial wastewater transferred from the Main Street facility and discharges the treated water to the Connecticut River under a NPDES permit.

The Pent Road facility is located on approximately 58 acres of land on Pent Road in East Hartford, Connecticut. The facility is used for testing of jet engines under simulated flight conditions, including potential failure modes. Testing of jet engines involves simulating, in test cells, the atmospheric and meteorological conditions encountered during flight, and measuring the responses and operation of the engines.

The Rocky Hill facility is located on approximately 52 acres of land at 60 Belamose Avenue in Rocky Hill, Connecticut. The site has been owned and operated by Pratt & Whitney since 1965. The site was the location of several rayon manufacturing facilities from 1927 until 1965. The Rocky Hill site is used for the manufacture and testing of various composite jet engine components. Operations at the facility include (or have included) molding, bonding, degreasing, metal finishing, electrochemical machining, and testing composite materials (such as graphite, plastics, aluminum, and titanium).

The North Haven facility is located at 415 Washington Avenue in North Haven, Connecticut. The facility is located on approximately 160 acres of land and has been owned and operated by Pratt & Whitney since 1952. The facility manufactures jet engine components, and operations at the facility include (or have included) chemical etching, electroplating, casting, vapor deposition, pickling, degreasing, and machining of various metals and alloys.

The Southington Manufacturing facility, is located on approximately 52 acres of land on Aircraft Road in Southington, Connecticut. The facility was operated from 1942 until 1995. From 1942 until 1956, the facility was owned by the US Navy, but was operated by Pratt & Whitney. The site was purchased by Pratt & Whitney in 1956 and was in continuous operation until 1995, when Pratt & Whitney closed the facility. The site was used for the manufacture of jet engine components. Operations at the site included machining of various metals and alloys, vapor degreasing, electroplating, electrochemical machining, and testing of jet engine components.

Overviews of the environmental setting and typical waste management practices are presented in the following sub-sections. Appendices A through F provide information for each facility on the site location and description, environmental setting, waste management practices, existing conditions, and environmental units.

2.2 Environmental Settings

2.2.1 Land Uses

Major portions of each of the six sites are occupied by buildings, paved areas, or covered storage areas. For all of the sites, the areas used by Pratt & Whitney for manufacturing and associated activities, as well as some parking areas, are surrounded by security fencing. Access to all developed portions of the sites is generally restricted to employees or escorted visitors and is controlled by daily 24-hour security. Land use adjacent to each site is generally commercial/industrial with some intermixed residential use. More detailed land use descriptions are provided in Appendices A through F.

2.2.2 Groundwater and Surface Water Classifications

The DEP has adopted water quality classifications for the groundwaters and surface waters of the State to categorize the existing quality of the water, the potential uses of the water, allowable discharges to the water, and the long-term state goals for water quality restoration. Surface waters and groundwaters are classified separately, and both classification schemes are based on the water quality standards adopted by the DEP.

The surface water quality classification of the Connecticut River in the vicinity of the East Hartford and Rocky Hill sites is SC/SB. This classification indicates that the river is not currently meeting the State's goal of SB. Class SB waters are high quality coastal and marine surface waters with designated uses for marine fish, shellfish, and wildlife habitats, recreation, industrial, and other legitimate uses, including navigation. A classification of SC indicates that the existing coastal and marine surface water quality is known to be polluted. In such waters, certain designated uses, such as swimming or providing for a healthy aquatic habitat may be precluded or limited.

The surface water classification of the Quinnipiac River in the vicinity of both the Southington Manufacturing and the North Haven sites is C/B. As indicated by the B notation, the State's long-term goal for these waters is attainment of class B water quality. Class B surface waters are suitable for recreational uses, fish and wildlife habitat, agricultural and industrial supply and other legitimate uses including navigation. A classification of C indicates that the present water quality precludes full attainment of one or more designated uses for class B waters. Class C waters may be suitable for certain fish and wildlife habitat, certain recreation activities, industrial uses, and other legitimate uses including navigation.

The groundwater classification underlying all of the sites, except Southington Manufacturing, is GB. A classification of GB indicates that the groundwater is known or is presumed to be affected by historic waste disposal activities or by historic intense urban, commercial, and industrial development. Designated uses for class GB groundwaters are industrial process water and cooling waters, but not direct human consumption. The groundwater beneath the Southington site is Class GA. Designated uses for Class GA groundwater include direct human consumption without treatment.

2.2.3 Water Supplies

All six of the Pratt & Whitney sites are located in areas with public drinking water supplies. On-site production wells are located at the Main Street facility, the Colt Street facility, the Rocky Hill facility, the Southington Manufacturing facility, and the North Haven facility. These on-site production wells are either used solely for process water supply or are currently unused.

2.2.4 Floodplain Information

Portions of the Main Street facility are within the 100-year floodplain of Willow Brook and Pewterpot Brook. Portions of the Colt Street facility, portions of the Pent Road facility, and portions of the Rocky Hill facility are within the 100-year floodplain of the Connecticut River.

Portions of the North Haven facility are within the 100-year floodplain of the Quinnipiac River. No portion of the Southington Manufacturing facility is located within a 100-year floodplain. Floodplain maps are presented for each site in Appendices A through F.

2.2.5 Surface Water Drainage

All of the six Pratt & Whitney facilities include areas of controlled and uncontrolled surface drainage. Surface water drainage is directed via storm drains to either local streams or to municipal storm sewer systems. Uncontrolled drainage typically occurs in undeveloped portions of the sites and is directed by local topography and soil conditions to local surface water bodies.

2.2.6 Meteorology

All of the East Hartford sites and the Rocky Hill site are located within the Connecticut River Valley of central Connecticut. The North Haven and Southington Manufacturing sites are located in the Quinnipiac River Valley, within approximately 28 and 17 miles of the East Hartford sites, respectively. The meteorologic conditions are similar at all six of the sites. Average temperatures for this region of Connecticut are approximately 24°F in the winter and approximately 74°F in the summer. Total annual precipitation averages approximately 44 inches.

2.2.7 Regional Geology

All six of the Pratt & Whitney sites lie in the Central Lowlands province of Connecticut, a north-south trending valley system, which is approximately 20 miles wide at East Hartford. The Connecticut River flows southward on the west side of the East Hartford sites, draining the northern part of the valley system to Long Island Sound. The river has created a broad floodplain and eroded terraces in the flatter portion of the valley system. The North Haven and Southington Manufacturing facilities lie in the valley of the Quinnipiac River, which, although smaller than the Connecticut River, also flows southward to Long Island Sound and has created a relatively broad floodplain.

The geology of the central lowlands consists of Jurassic-Triassic age sedimentary and igneous bedrock overlain by unconsolidated sediments. The bedrock stratigraphy consists of four sedimentary rock units: the New Haven Arkose, and the Shuttle Meadow, East Berlin, and Portland Formations. Each of these units are separated from the overlying formation by interbedded, laterally continuous basalt flows. The sedimentary rocks are primarily composed of interlayered red or grey siltstones, shales, mudstones, sandstones, and conglomerates. The bedrock layers generally dip to the east and are crosscut by faults.

The unconsolidated sediments in much of the region can be divided into three major units, deposited in the following order; glacial till, glaciofluvial and glaciolacustrine deposits, and post-glacial fluvial deposits. The glacial till (where present) or glaciofluvial/glaciolacustrine sediments were generally deposited directly over bedrock.

The till is poorly sorted and varies widely from a non-compact mixture of sand, silt, gravel, and cobbles with trace amounts of clay to a compact mixture of silt and clay with some sand, gravel, and cobbles. The glaciofluvial sediments generally consist of well-stratified sand, gravel, and silt deposited by meltwater emanating from the retreating glacier.

Glaciolacustrine deposits consist of both silt and clay lake bottom sediments, and sand and gravel deposits formed by beaches and deltas in the lake. Thicknesses of lacustrine clays and silts as great as 270 feet have been documented for the East Hartford Main Street facility. The unit is thickest in areas of deep bedrock valleys.

Post-glacial fluvial sediments generally consist of sand and silt deposited by the Connecticut River or the Quinnipiac River. In addition, a thin veneer of post-glacial eolian (wind-blown) sediments was deposited over parts of the East Hartford area. These deposits typically consist of yellowish-brown, fine- to medium-grained sand and silt. These deposits are typically only locally important.

2.2.8 Regional Hydrogeology

The regional drainage basin for the East Hartford and Rocky Hill facilities is the Upper Connecticut River Basin. For the Southington and North Haven facilities, the regional drainage basin is the Quinnipiac River Basin. Regional groundwater flow in each of these basins would generally be expected to be to the south, following the trend of the river valley. Local groundwater flow would be controlled by local geologic and hydrogeologic conditions, such as topography and the presence of water supply (production) wells.

There are generally four saturated hydrogeologic units in the subsurface beneath the region. These include: (1) sedimentary and igneous bedrock; (2) glacial till (and limited glaciofluvial sediments in the East Hartford area); (3) glaciolacustrine fine sand, and clay, deposits; and (4) glaciofluvial sand and gravel and post-glacial fluvial deposits. These units may not all be present at any one site, and their local significance is site-specific.

The yield of wells completed in the bedrock aquifer in the region is generally sufficient only for domestic water supplies. The overburden aquifer in many areas may be relatively coarse-grained and be able to provide sufficient amounts of water for public water supplies, although such use is not uniform throughout the region.

Glacial till is generally thin and discontinuous, poorly sorted, and contains large amounts of silt and clay, although sandy zones exist. This unit is usually a poor aquifer and is rarely used even for domestic production. Glaciofluvial sediments at depth beneath the East Hartford area can be coarse-grained and capable of producing large amounts of water, but these deposits are not laterally extensive and are only locally important.

The majority of the glaciolacustrine deposits are comprised of fine sand, silt, and clay. These sediments have relatively low permeability and may function as a confining layer. The glaciolacustrine deposits also include limited glaciofluvial sand and gravel lenses and areas of sandy beach and deltaic deposits. These deposits may be locally important as aquifers.

Glaciofluvial and post-glacial fluvial deposits generally comprise the majority the upper zones of the unconsolidated aquifers in the region. In some areas, these deposits may have significant saturated thicknesses and extent.

2.3 Waste Management

2.3.1 Facility Operations

The East Hartford Main Street plant, the Rocky Hill facility, the North Haven facility, and (when it was in operation) the Southington Manufacturing facility, were all involved in similar processes. These facilities are/were engaged in the manufacture and testing of jet engines and jet engine components (SIC code 3724). The manufacture of jet engines is a high-technology industry, often using state-of-the-art materials and processes, including fabricating, metal casting, testing, cleaning, finishing, coating, and research operations. These operations involve a variety of materials which include polyamide fibers, graphite, plastics, various metals and alloys, and resins. The processing of these materials involves the use of a variety of compounds for working, cleaning, and evaluating.

The Pent Road facility is a testing facility for evaluating the performance and operation of jet engines at simulated operating conditions. This facility also includes a bulk tank farm used for storage of a variety of petroleum products (mostly jet fuels and heating oils). The Colt Street facility has only been used for the treatment of industrial wastewater generated at the Main Street facility.

2.3.2 Waste Generation, Handling, and Characteristics

All of the sites generate some forms of hazardous wastes. Specific information regarding the types of waste generated at each of the sites is discussed in detail in Appendices A through F. Manufacturing operations produce (or produced) wastes from a variety of operations, including: machining, electroplating, electrochemical machining, degreasing, anodizing, pickling, non-destructive testing, and facility operation and maintenance. The wastes that are (or were) produced include a wide variety of compounds, including: acids, alkalies, cyanides, alcohols, metal plating solutions, specialty solutions, fungicides, epoxies, cleaners, resins, paints, solvents and PCBs.

Wastes are characterized in a uniform fashion for all Pratt & Whitney facilities. Wastes are identified through one or more methods, including process information, manufacturer's information, and laboratory analysis.

Pratt & Whitney maintains information on the various process solutions used at the facilities. The individual components of these solutions are identified by process material control (PMC) or Pratt & Whitney (PW) numbers. These solutions are or were made on-site with virgin material (e.g., acids, alkalies, chromium compounds, and cyanides). Other wastes are characterized solely by laboratory analysis.

Solutions are (or were) discarded for various reasons, including: (1) acid solutions are (or were) sometimes discarded if they become (or became) dilute, (2) portions of the solutions are (or were) sometimes discarded if they are (or were) too concentrated, or (3) other solutions are (or were) discarded when they can (or could) no longer adequately perform their designated function.

2.3.3 Waste Disposal Practices

Facility-generated hazardous wastes are (or were) disposed of either through the Pratt & Whitney Main Street facility in East Hartford, Connecticut, or through commercial waste disposal facilities. The following waste types are (or were) transported to the Main Street facility for treatment and disposal: concentrated acid solutions; concentrated alkali solutions; concentrated chromium solutions. Paints and waste paints, laboratory chemicals and commercial chemical products, and metal hydroxide sludge, may be (or have been) shipped to the Main Street facility and then to a commercial waste disposal facility for final disposition. Alternatively, these wastes may be (or have been) shipped directly off-site to a commercial waste disposal facility. Between the early 1970s and early 1980s, metal hydroxide sludge was stored in on-site surface impoundments at several of the facilities (Main St., Colt St., Southington, and North Haven). In addition, for a short period of time, this sludge was disposed of on-site at the North Haven facility. Waste wax/solvent and oil/solvent mixtures are (or were) sent to the Main Street facility and then reclaimed.

SECTION 3 - STUDY AND EVALUATION METHODOLOGIES

This section outlines the objective and major phases of the Voluntary Corrective Action Program (VCAP). The major phases of the VCAP include: 1) a preliminary qualitative risk assessment; 2) a modified RCRA Facility Investigation (RFI); 3) a quantitative risk assessment; 4) an assessment of stabilization measures, (where necessary), and 5) implementation of stabilization measures (where needed).

The more traditional phased investigation and remediation approach, as outlined in the Connecticut Department of Environmental Protection (DEP) Remediation Standard Regulations (RSRs), will be followed at those sites which Pratt & Whitney is planning to sell (i.e., the Southington Manufacturing facility and the airport portion of the East Hartford facility). It is possible that final remedies may have already been implemented at these sites by the year 2000.

3.1 Objective of the VCAP

The primary objective of the VCAP is to initiate stabilization activities at the six facilities, on or before December 31, 1999. To that end, the investigation of releases at each facility will focus on providing that data necessary to determine what actions, if any, must be taken to achieve stabilization. Moreover, at facilities that Pratt & Whitney intends to sell, final remediation measures may also be initiated or completed by the year 2000.

As stated in the Memorandum of Understanding (MOU), the Stabilization Measures of Success include both the Human Exposures Controlled Performance Standard and the Groundwater Releases Controlled Performance Standard. These performance standards are based on guidance specified in the July 29, 1994, U.S. EPA "RCRIS Corrective Action Environmental Indicator Event Codes" and are stated as follows:

A. Human Exposures Controlled Performance Standard

"Remedial measures have been implemented with the result that all maximum contaminant concentrations detected or reasonably suspected are less than or equal to their respective action levels or do not exceed an EPA specified cleanup standard for the Facility."

OR

"There is no unacceptable human exposure to any contaminant concentration above action levels that has been detected or is reasonably suspected based on current contaminant concentrations and current site conditions. Although contamination remains at the Facility that may require further remediation, action has been taken or site conditions are otherwise such that unacceptable threats to human health from actual exposure to the contamination are not plausible based on current uses of the site. Such actions may include the use of physical barriers or institutional controls (e.g. deed restrictions or alternative water supply)."

B. Groundwater Releases Controlled Performance Standard

"An engineered system has been installed that is designed and operating (including performance monitoring) to effectively control the further migration beyond a designated boundary such as the engineered system, the Facility boundary, a line upgradient of receptors, or the leading edge of the plume as defined by levels above EPA established action levels or cleanup standards."

OR

"The EPA has determined that the groundwater cleanup objectives can be met without the use of an engineered system through the remedial measures selected, including Facilities where the contamination will naturally attenuate."

3.2 Preliminary Qualitative Risk Assessment

Given the objective and the performance standards outlined in section 3.1, the first step of the program will be to perform a preliminary qualitative risk assessment to identify potential human receptors and potential exposure pathways. Using this information and available information on known or potential releases, transport and fate characteristics, and groundwater classifications, preliminary conceptual site models (CSMs) will be developed. Institutional controls will also be evaluated as a means to eliminate potential exposure pathways. When pathways are eliminated, the CSMs will be refined. Upon refinement of the CSMs, site-specific action levels will be developed.

3.2.1 Development of Conceptual Site Model

The conceptual site model (CSM) is a three-dimensional characterization of site conditions including known or potential source areas, release mechanisms, contaminant distributions, exposure pathways and migration routes, and potential receptors. The CSMs will take into account all available information on environmental setting characteristics, environmental units, known or potential releases, soil and groundwater quality, and relevant exposure scenarios. In developing the initial CSM for each facility, particular emphasis will be placed on identifying exposure pathways and potential receptors.

To determine potential receptors and exposure pathways for a given release (or potential release), it is necessary to understand the contaminant-specific and site-specific factors which can influence fate and transport in the environment. Therefore, data collection will focus on these factors and on determining whether or not a complete exposure pathway exists from the point of release to the identified human receptors. If it can be demonstrated that a potential exposure pathway is not complete, that potential pathway will be eliminated from further consideration.

Where it is not possible to demonstrate that an exposure pathway does not exist or is not complete, media-specific sampling at the exposure point may show acceptable concentrations. For example, indoor air monitoring may show that volatilization of contaminants from soil or groundwater does not pose a risk to human health inside the building.

Exposure pathway identification will be based on the assumption that land use at each site will remain industrial/commercial, as specified in the MOU. Making this assumption eliminates the need to address those potential exposure pathways that are associated solely with residential use. Identification of exposure pathways will be made for each EU, or category of EU, at which a release is documented or the potential for a release exists.

Under the VCAP, exposure pathways, such as the exposure of construction workers to subsurface soil contamination, may be controlled by Pratt & Whitney through the use of institutional controls. Existing controls, such as access limitations and confined space entry procedures, will also be considered sufficient control for elimination of a pathway. All institutional controls will be taken into account in designing investigations and performing risk assessments.

To initially identify any potential human receptors, it will be necessary to acquire information pertinent to activities conducted at the site and in the surrounding area. This will include types and locations of activities performed on the site, as well as potential site construction and utility information. To identify potential off-site receptors, information on the surrounding population and land use, local groundwater classifications and use, and proximity of public or private water supplies will be reviewed.

3.2.2 Development of Action Levels

Site-specific action levels will be developed for both soil and groundwater prior to the commencement of field investigation activities. Development of these action levels will take into account specific constituents of concern and conceptual site models for each facility. The factors used in development of the action levels will be conservative in nature, relative to the intended industrial/commercial use, and will also be protective of potential off-site receptors.

For soil, action levels will be developed using the approaches described in the U.S. EPA Soil Screening Guidance (1996) modified to reflect the objectives of stabilization. For groundwater, it is assumed that further investigation will show no drinking water supplies are affected. If this is true, the only potential pathway to be considered for the impact to human health is volatilization. The action levels for groundwater will be developed using equations modified from the 1996 EPA soil screening guidance.

If the site-specific action levels are exceeded, then EU-specific (for soil) or area-specific (for groundwater) action levels will be developed. These EU/area-specific action levels will be calculated using the same equations as the initial action level calculations but will be based on a comparison of the conservative assumptions used initially with actual conditions at the location where exceedances were observed.

If detected concentrations at any location are found to exceed the EU/area-specific action levels, then a quantitative human health risk assessment will be performed to develop media protection standards which will be used to determine whether or not stabilization measures are necessary. The major components of the quantitative human health risk assessment are discussed in Section 3.4.

3.3 Modified RCRA Facility Investigation (RFI)

Based upon the development and evaluation of the CSMs and action levels, data gaps will be identified and sampling plans will be prepared for soil and groundwater investigations. These investigations will focus on gathering information necessary to mitigate exposure, not defining the source or degree and extent of contamination; hence Pratt & Whitney is referring to this as a modified RFI.

Data may be collected on subsurface conditions at specific EUs to understand the environmental setting as it relates to exposure pathway identification, and fate and transport of known or potential contaminants. This data may include: 1) grain-size distribution, bulk density, laboratory permeability, total organic carbon content, cation exchange capacity, and pH based on soil sample analyses, 2) estimations of hydraulic conductivity in the saturated zone based on in-situ techniques such as slug/bail tests or pumping tests, 3) groundwater flow directions and hydraulic characteristics based on water levels in on-site and nearby monitoring wells, and 4) intrinsic remediation information based on analyses of groundwater samples for parameters such as dissolved oxygen, carbon dioxide, methane, nitrogen and sulfur compounds, and iron.

Where it is determined that soil sampling will be performed, the focus of the sampling effort will be to provide the information necessary to complete exposure scenarios, conceptual site models, or release hypotheses. If it becomes apparent during the data evaluation process that data gaps exist, supplemental sampling will be performed.

Groundwater sampling plans will be developed for each facility on an area-wide basis. The primary focus of the groundwater sampling efforts will not be to identify releases from individual EUs but rather to ensure that concentrations of contaminants in groundwater at designated boundaries do not exceed the established action levels or media-protection standards.

The Data Quality Objectives for the sampling programs and the procedures that will be used to collect data in accordance with the sampling plans are presented in the Data Collection Quality Assurance Plan (Section 6 of this Work Plan). The Data Quality Objectives specify the requirements for accuracy, precision, completeness, representativeness, and comparability of analytical data collected during the VCAP.

3.4 Quantitative Risk Assessment

The function of the Preliminary Qualitative Risk Assessment, as described in Section 3.2, is to determine whether imminent and substantial endangerment to human health or the environment exists. If such endangerment exists, a quantitative risk assessment will be performed to calculate media protection standards in accordance with existing guidance, primarily *Risk Assessment Guidance for Superfund, Human Health Evaluation Manual, Part B: Development of Risk-Based Preliminary Remediation Goals*, EPA, 1989. The appropriate simulations will be run and clean-up levels will be back-calculated to ascertain the 95 percent upper confidence limit of the arithmetic mean concentrations, which correspond to an acceptable risk. The target risk levels selected for use in the calculation of risk-based soil and groundwater response levels will be as follows:

For carcinogenic effects, concentrations are initially calculated that correspond to a risk of 10^{-6} as a result of exposure to a specific chemical from all significant pathways for a given media.

For noncarcinogens, concentrations are calculated that correspond to a hazard index of 1, which is the level of exposure to chemicals from all significant exposure pathways for a given media below which it is unlikely for even sensitive populations to experience adverse health effects.

Chemical concentrations resulting in the selected target risk levels will be developed for carcinogens and noncarcinogens and will be based upon exposure scenarios for existing conditions at the site, as well as any unique scenarios that may be posed by remedial actions. A comparison of site-wide concentrations with risk-based response levels will then be performed to identify areas potentially requiring remedial action. It is important to note that media protection standards generally represent acceptable **average** concentrations of site-related contaminants. If the entire site were remediated to this level, the resulting site-wide average concentration would fall well below the response level. The delineation of areas requiring remediation is, therefore, not a point-by-point comparison of all sampling results to an appropriate response level, but a comparison of the upper bound of the site-wide average concentration to a response or cleanup level.

3.5 Assessment and Implementation of Stabilization Measures

The evaluation and selection of stabilization alternatives will be performed only for environmental units or areas of groundwater contamination where media-protection standards, developed from a quantitative human health risk assessment, are exceeded. The evaluation and selection process will address cost/benefit issues (including estimates of risk reduction or elimination), time required to achieve the performance standards identified in the MOU, and the potential for the stabilization measure to serve as the final remedy.

Initially, a variety of potentially applicable stabilization measures (including natural attenuation) will be identified. These alternatives will then be evaluated and data gaps, including the need for pilot testing, will be identified. After addressing the data gaps, final selection of the appropriate stabilization measures will be made. Measurable and attainable performance standards, by which the effectiveness of the selected stabilization measures will be evaluated, will then be developed.

SECTION 4 - PROJECT MANAGEMENT PLAN

4.1 Introduction

As stated in Section 3 (Study and Evaluation Methodologies), the primary objective of the VCAP is to have initiated stabilization activities at the six sites in question by December 31, 1999. As was also noted in Section 3, the Airport and Klondike Area, located at the Main Street facility in East Hartford, and the Southington Manufacturing facility may be sold within the next few years (Refer to Figure 4-1). Therefore, it is expected that these sites will meet the objectives of the stabilization goal prior to the December 31, 1999 deadline and that, in some cases, implementation of final remedies may have already begun.

This Project Management Plan (PMP) presents the overall schedule for the major tasks along with a discussion of the general staffing requirements needed for the VCAP. Schedules have been prepared both for sites being stabilized and for those anticipating final remedy. In addition, the lines of communication and the responsibilities of currently identified team members are also discussed.

4.2 Schedule

A schedule for sites being stabilized is included as Figure 4-2. A schedule which details the investigation and remediation milestones for the Airport/Klondike, located at the East Hartford facility, and the Southington Manufacturing facility is included as Figure 4-3. These high-level schedules will be updated and reviewed with the EPA and DEP at the semi-annual progress meetings, which will begin in 1997. In addition, as the program progresses and more specific investigation and stabilization activities are undertaken, Pratt & Whitney will generate more detailed schedules in order to facilitate more efficient project management. If the EPA and DEP desire, these detailed schedules can be presented and reviewed at the semi-annual progress meetings.

As stated above, Pratt & Whitney will hold semi-annual progress meetings with the EPA and DEP. The topics which will be discussed in these meetings include the following:

- A description of tasks that have been completed in the previous six months (e.g., sampling activities and identification of potential receptors);
- A description of tasks that were planned for completion but were not completed by the meeting date, along with an explanation as to why those tasks were not completed and the potential impacts on the schedule;

- Summaries of results for any sampling that may have been conducted or any other data generated or received during the previous six months;
- A review of any issues that may impact the proposed schedules and the action items that are required to get the program back on schedule; and,
- A projection of tasks for the next six months, along with the associated schedules.

It is anticipated that the first progress review meeting will be scheduled for June 1997. An exact date will be agreed upon by Pratt & Whitney, EPA, and the DEP during the second quarter of 1997.

4.3 Staffing

Given the scope of the VCAP, several individuals from Pratt & Whitney, EPA, and the DEP will be responsible for the overall management of the program. A responsibilities matrix, which delineates the projects and/or functions that will be co-managed between the various DEP, EPA, and Pratt & Whitney staff members is shown below. As noted in the matrix, David Ringquist, Ernie Waterman, and Troy Charlton will be responsible for ensuring the overall consistency of the VCAP.

Project/Function	DEP Staff	EPA Staff	Pratt &Whitney
Program Coordination	David Ringquist	Ernie Waterman	Troy Charlton Jeff Loureiro (LEA)
East Hartford (Main Plant) Colt Street Pent Road	David Ringquist	Juan A. Perez Aaron Gilbert "	Jody Klenk
North Haven Rocky Hill	David Ringquist	Ernie Waterman	Mark Busa
Southington Manufacturing	David Ringquist	Carolyn Casey	Lauren Levine

Figure 4-4 is a chart which outlines the general organization that will be utilized by Pratt & Whitney in the performance of the VCAP.

The responsibilities of the key personnel as identified in Figure 4-4, are described below:

- Program Manager(s) - The Program Manager(s) will be responsible for overseeing the implementation of the Memorandum of Understanding (MOU) and ensuring that it is implemented consistently at all six sites.

- Project Managers - The Project Manager(s) will be responsible for overall management of investigation and remediation activities at specific sites and/or areas. This includes preparation and management of project budgets and milestones and coordination of project personnel, the laboratory, and other subcontractors.

- Field Services Manager - The Field Services Manager will be on-site for field investigation work and will have overall responsibility for all information generated as part of field work and will oversee proper collection and recording of data as specified in the DCQAP. This individual will regularly communicate directly with the Project Manager.

- Quality Assurance/Quality Control Officer - The QA/QC Officer will be responsible for the overall evaluation and quality of all phases of the investigation. This shall include periodic assessments and audits of the data and procedures to ensure that the work is being performed to the standards specified in the work plans. Should the QA/QC officer determine non-compliance, corrective action will be implemented through systems or performance audits or by standard QC data review.

- Task Specialist - The Task Specialist(s) is an expert in a particular field such as hydrogeology, risk assessment, environmental engineering, etc. The task specialist will be responsible for the technical quality of the work performed in their area of expertise.

- Health and Safety Officer - The HSO will be responsible for ensuring compliance with the site-specific health and safety plans during implementation of field activities. The HSO reports directly to the Project Manager.

- Laboratory Project Manager - The LPM will be responsible for providing information concerning the needs of the project to the laboratory staff. The LPM will communicate directly with the Project Manager. The LPM will assign resources to identified needs requiring attention. The LPM will also assure that all laboratory specific procedures and internally prepared plans and reports meet project QA requirements. The LPM will serve as the liaison between the laboratory and the project staff as well as other internal/external organizations to ensure that the laboratory's performance meets the requirements of the project.

FIGURES

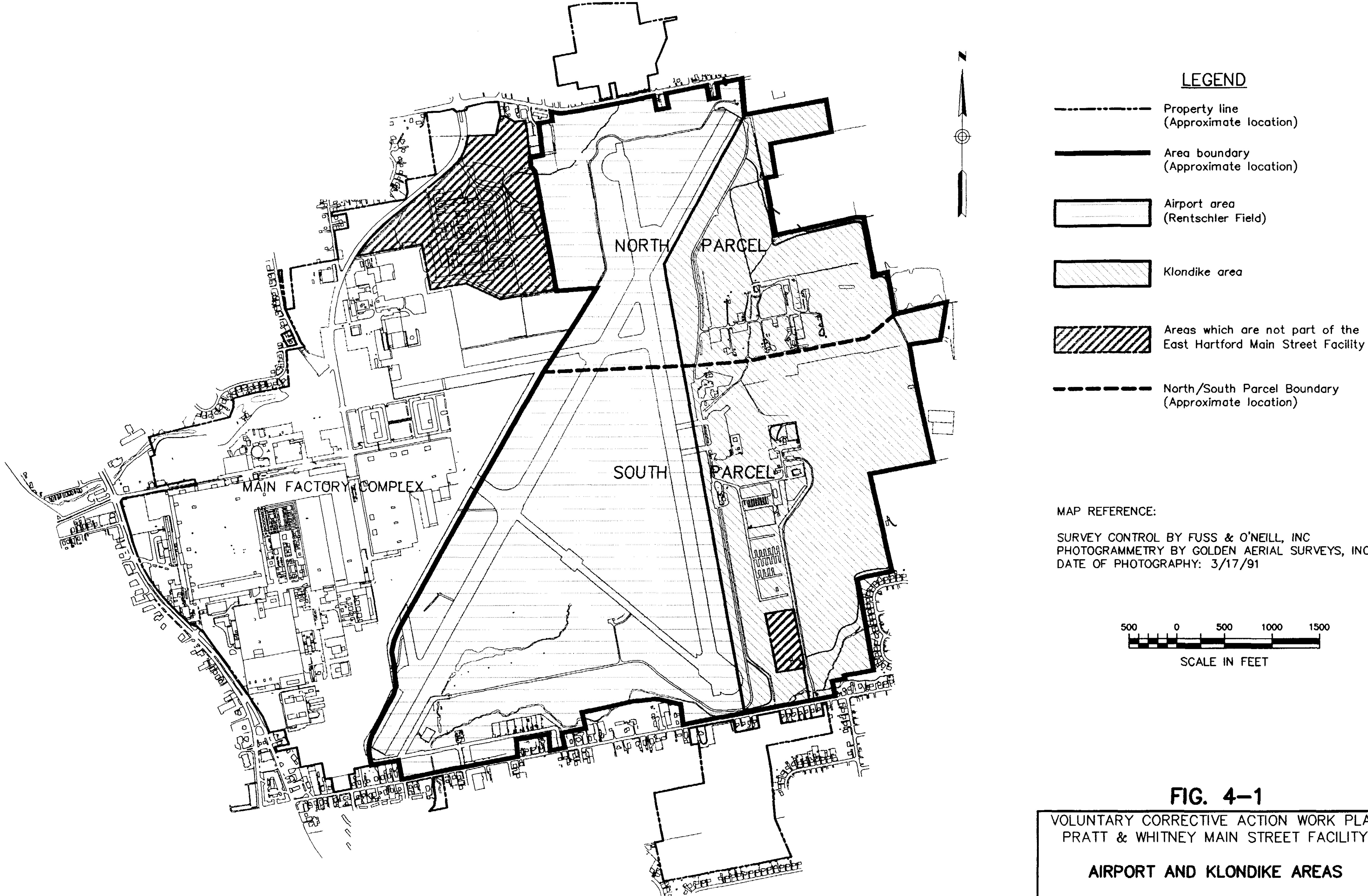

FIG. 4-1

VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY MAIN STREET FACILITY

AIRPORT AND KLONDIKE AREAS

Comm.No. 68VC601	Pratt & Whitney A United Technologies Company / LEA

VEH-FIG2 (1000)

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PROPOSED OVERALL SCHEDULE
VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY CONNECTICUT FACILITIES

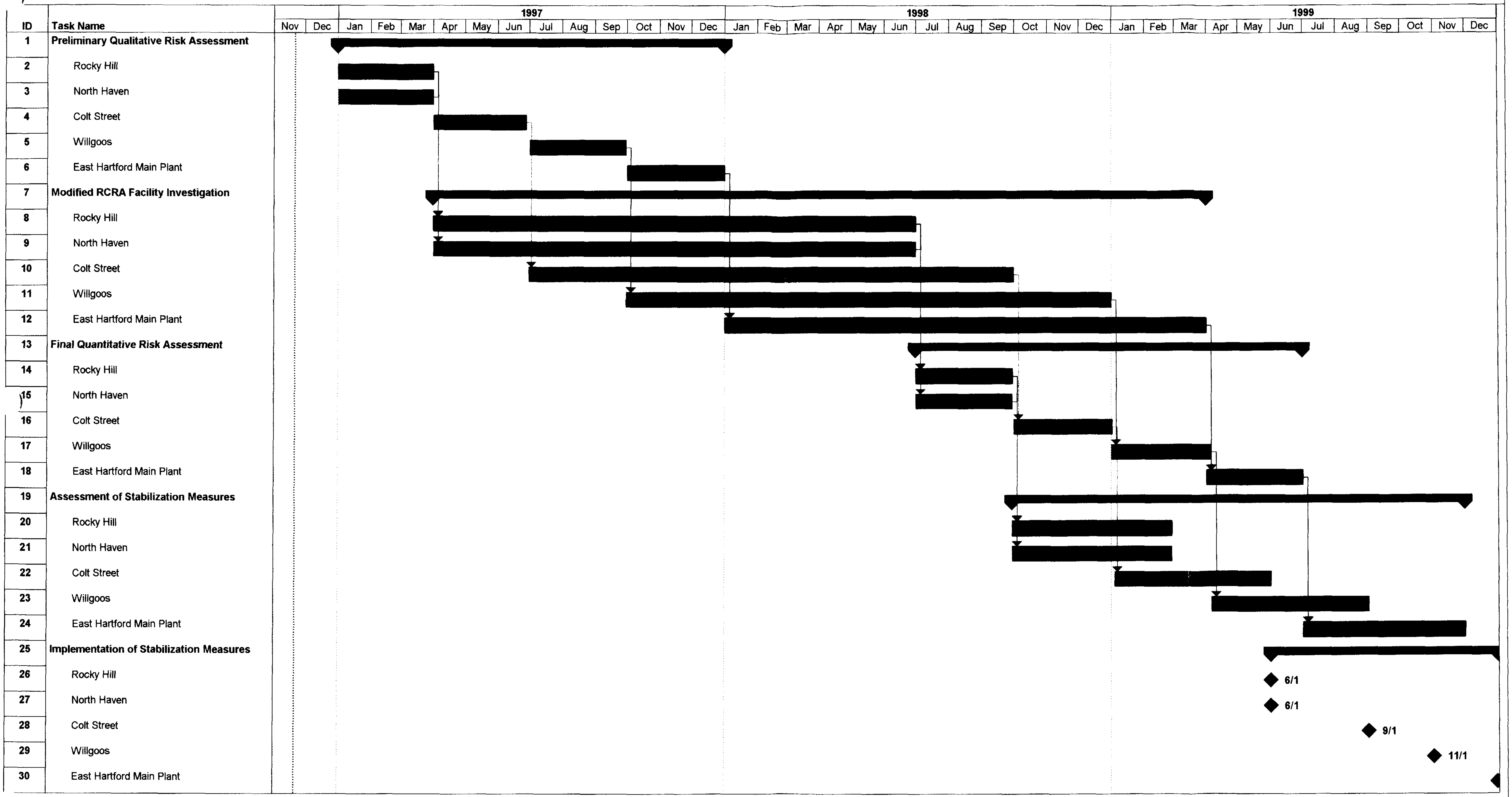
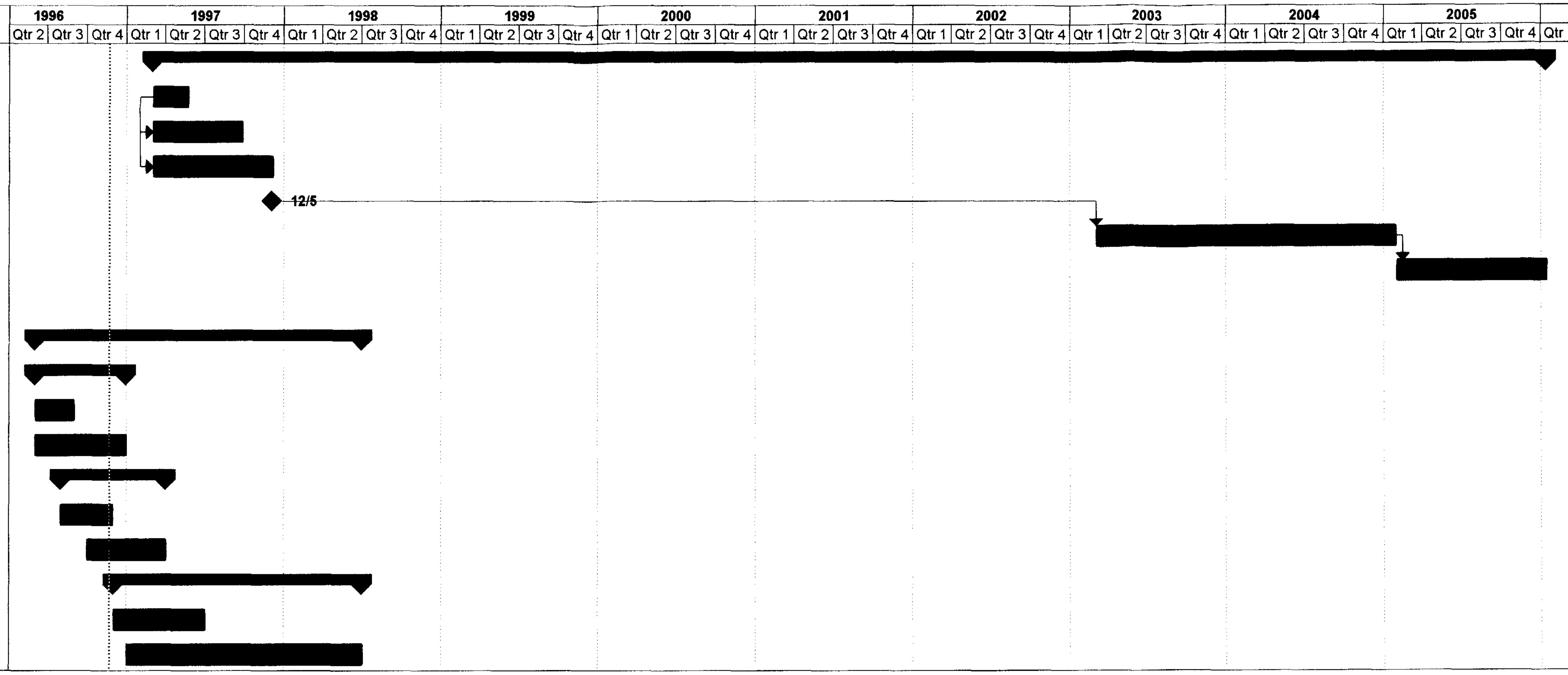


FIGURE 4-2

Originals in color

PROPOSED SCHEDULE FOR FINAL REMEDIATION
SOUTHINGTON MANUFACTURING AND EAST HARTFORD AIRPORT/KLONDIKE AREAS

ID	Task Name
1	**Southington Manufacturing Remediation/Stabilization**
2	Closure of RCRA units
3	Soil/Groundwater Investigation
4	Remediate/record ELURs, as needed, to address CT RSRs
5	Complete Stabilization of site per EPA MOU
6	Detailed groundwater study/TI demonstration, if appropriate
7	Complete necessary site work
8	
9	**Rentschler Airport/Klondike Area Remediation**
10	**Phase I Investigation**
11	North Airport/North Klondike
12	South Airport/South Klondike
13	**Phase II/III Investigation**
14	North Airport/Nortk klondike
15	South Airport/South Klondike
	Remediation Completed
17	North Airport/Nortk klondike
18	South Airport/South Klondike



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Thu 11/21/96

Task | Milestone | Rolled Up Task | Rolled Up Progress
Progress | Summary | Rolled Up Milestone

FIGURE 4-3

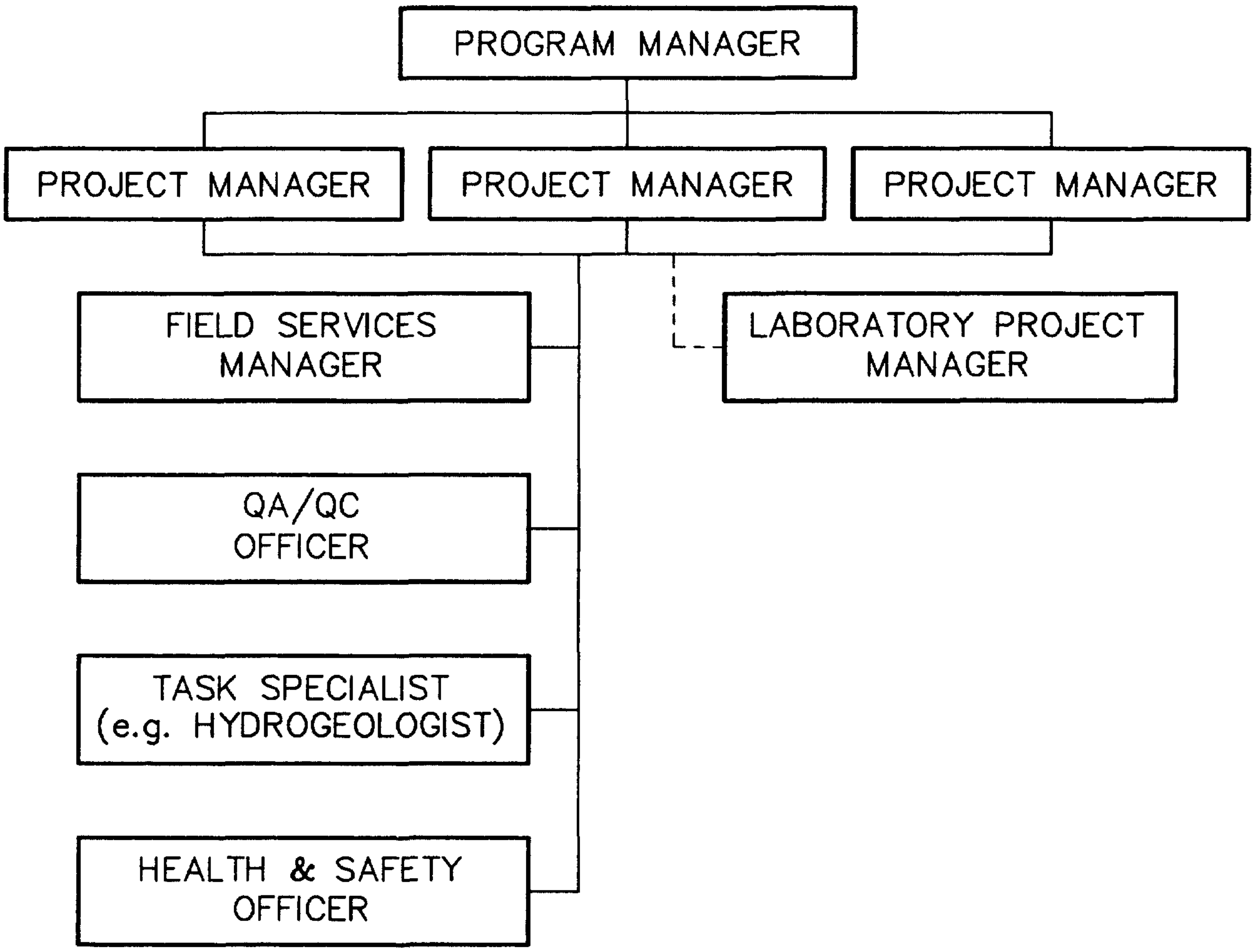

FIG. 4–4

VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY CONNECTICUT FACILITIES

PROJECT ORGANIZATION CHART

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SECTION 5 - DATA MANAGEMENT PLAN

5.1 Introduction

Because a large volume of data will be generated during the Voluntary Corrective Action Program (VCAP), it is necessary to develop a data management plan to ensure the completeness and integrity of all data associated with the program. Information provided in the data management plan addresses the documentation, tracking, and manipulation of data collected during the VCAP. This plan identifies the data documentation materials and procedures, project file requirements, and procedures and documents for project data. Given the number of Pratt & Whitney facilities involved in the VCAP and the diverse nature of the investigation that may be conducted at each of those facilities, it is imperative that the procedures for handling data from the collection to the reporting phase be clearly outlined and documented.

This data management plan identifies the personnel involved in the data management process, the types of activities associated with data management and how those activities are performed, the chronology and flow of data management activities, and the methods and locations for data storage and reporting.

5.2 Data Management System

5.2.1 Types of Data

Many types of data will be generated and managed during the VCAP. Included in the data management process will be analytical data collected during field activities (such as measurements of pH, specific conductance, and temperature of groundwater during groundwater sampling events); information related to sample collection (such as location I.D., sample number, sample depth, date and time of sample collection, analyses to be performed); analytical results from screening or field laboratory; analytical results from the fixed laboratory(ies), survey data of sampling locations; and geologic and hydrogeologic data (such as boring logs, well construction diagrams, and waterlevel elevations). These data will be included in the appropriate electronic databases for the type of information generated, and will be managed in accordance with the protocols identified in the appropriate subsections of this Data Management Plan. Management procedures for hard copies of the information generated during the VCAP will also be identified in relevant subsections of this plan.

5.2.2 Data Storage

Data will be maintained in three types of electronic databases as follows. All sampling and analytical information will be maintained in the analytical database. Information maintained in that database will include sampling location and depth, sample collection date, sample number, results of field and/or laboratory analytical data. Surveyed data (horizontal and/or vertical coordinates) for sampling locations, measured sampling locations, and other information on site plans will be maintained in a separate database for use with AutoCAD® operations, such as the construction of various site plans and facility base maps and geologic cross-sections. A third electronic database will be used for the storage of boring log information details of monitoring well construction. Both the analytical and the AutoCAD® databases will include historical electronically available information from each facility included in the VCAP.

Paper copies of the various field forms and laboratory reports will be organized and maintained in a separate filing system, as appropriate for each type of data. Incoming data will be logged in both the project analytical database and on hardcopy. The hardcopy will then be appropriately placed in the central file. Analytical results from the laboratories will be associated with the sample identification numbers assigned during sample collection. Field log books also will be kept as part of the central file and considered to be original documents.

Original field notebooks, log sheets, and other information will be transferred from the central file to a designated archive location upon the completion of the project. Chemical and physical data generated during the site investigation will be stored in paper document form. In addition, computerized data will be stored in electronic back-up formats.

5.2.3 Data Management Process

The actual management of data collected during the VCAP is only part of the larger process of sampling design; sample collection; acquisition of analytical data; data retrieval, storage, and presentation; and data evaluation. A schematic diagram illustrating the data management process and how it fits into the overall VCAP investigation process is presented in Figure 5-1. This figure outlines the flow of data from planning stages through collection and analysis to final output and storage. The data management process itself essentially consists of those activities associated with recording, processing, linking, distributing, and reporting of data.

The protocols outlined within the Data Management Plan have been prepared to ensure the accurate capture and retrieval of data needed to achieve the objectives of the VCAP. These protocols ensure that, for each data collection activity, data can be readily incorporated into the appropriate database, correlated with information from other databases and other aspects of the VCAP, and subsequently reported and presented in a variety of formats.

The earliest steps (1-6) in the Data Flow Diagram identify naming conventions to enable database retrieval consistency. These conventions will be identified during preparation of the sampling and analysis plans for each facility. The Data Management Plan will maintain sample integrity through the sample tracking activities highlighted as steps 5, 6, 8, 10, 12, 15, and 16. Field sampling is represented by steps 10 and 11. Data management protocols addressing submittals to and from analytical laboratories are shown in steps 7, 9, 12, and 13. The database manager will process data from field teams in steps 16, 19, 20, and 22. Data verification activities for analytical results to be incorporated into the analytical database are shown in steps 17, 18, and 21. The spatial, geotechnical and analytical data will be processed in the three independent streams depicted in the data flow diagram. Various data evaluation activities are identified in steps 23 through 28.

5.3 Data Management Activities

5.3.1 Data Management Team

The data management team will consist of the data manager(s), project managers, technical task leaders, field team leaders, field investigation teams, and laboratory contact personnel. The project manager will provide guidance and oversight for data management activities.

5.3.2 Data Management Tasks

The data management team will perform the tasks identified in the following paragraphs. The individuals involved with each task will be project specific and will depend on the size and scope of each project.

Data coordination tasks associated with sampling, analysis and field activities will include:

- logging of incoming data and reports into the central file both on the computer tracking system and hard copy, as appropriate.
- entering and verifying field data and generating reports,
- coordination of analytical field data,
- tracking chains-of-custody and field screening results,
- tracking shipment of samples to the off-site laboratory,
- tracking samples and electronic deliverables from the off-site laboratories, and,

- verifying analytical data from off-site laboratories using appropriate protocols.

Tasks associated with database management specifically include:

- coordinating data preparation, data loading, and data verification for the database;
- working with project staff to develop schedules for delivery of analytical results;
- entering and verifying data in the database; and;
- coordinating with technical task leaders to ensure efficient delivery and presentation of data.

Specific activities associated with various data management tasks are summarized in the following sub-sections.

5.3.2.1 Data Inputs

Field Measurements

Field measurements include physical data (e.g. pH, temperature, specific conductance) collected during investigation activities. Measurements will be recorded in the field and transferred manually from the field data sheets to the electronic analytical database. Data from the database will then be verified against the hardcopy field data sheets.

Onsite Analytical Measurements

Analytical measurements determined using a portable gas chromatograph either at the site or at the screening laboratory will be reported in both hard-copy and electronic formats. The electronic data will be transferred to the analytical database, and the results from that database will be verified against the paper copy laboratory reports.

Off-site Analytical Measurements

Off-site analytical measurements will be generated by an off-site analytical laboratory. These analytical results may be delivered in both paper copy and electronic formats and will be sent to the database manager for incorporation into the analytical database. Electronically transmitted data will be verified against paper copy reports prior to incorporation into the actual analytical database.

Soil Boring and Well Construction Data

Soil boring and well construction data will be included in the geologic/hydrogeologic database for the program. Boring logs will include such information as lithology, results of standard penetration tests (if appropriate), sample collection information, and VOC screening results. A monitoring well construction diagram will be provided for each monitoring well installed during the VCAP.

Survey Data

Surveying of well and boring locations and selected site features will be performed as part of the site characterization process. All survey information will be included in the AutoCAD® database for each project site. This information will be used to locate sampling points and other pertinent features on the AutoCAD®-generated drawings that are produced as the base maps for each facility.

5.3.2.2 Field Sample Tracking

Field sample tracking activities focus on the timely tracking of information regarding field samples collected for each investigation. Other information tracked includes sample identifiers, chain of custody information, and sample characteristics. The information will be transmitted from field to office personnel through the use of daily field summary sheets and other project information tracking forms found in the DCQAP.

Samples collected during the VCAP investigations will be designated using the procedure described in the SOP for Soil Sampling in the Data Collection Quality Assurance Plan (DCQAP) presented in Section 6 of this Work Plan. In general, sample identification information will include the following:

- Site location
- Date and time
- Sample matrix
- Sample type
- Sample point number
- Sequential sample number (for multiple depths or times)
- Sample depth interval (where applicable for soil samples)

Specifically, field sample tracking includes the following tasks:

- Assignment of sample identification numbers and other sample identifiers to new samples to be taken, and entry to a tracking system
- Production of sample bottle labels from the tracking system
- Completion of Chain-of-Custody forms, and entry of this information to the tracking system
- Entry of additional tracking dates to the tracking system
- Quality Assurance (QA) checking of the sample tracking information, and processing of change requests
- Production of tracking reports and summary sheets, with distribution to appropriate project staff

Daily field forms and/or a field log book will be completed by each field team leader. The daily field forms (or log book) will detail the daily activities conducted by the staff and contractors, hours logged by staff and contractors, problems encountered, general field observations, and samples submitted for analyses. Field forms will be submitted to the Field Activities Coordinator at the end of each working day or as soon thereafter as possible. The field forms will be subsequently placed in the central file. The field log books (if used) will be placed in the central file upon completion of the project.

The field activities coordinator for each project will work closely with the specific project manager to ensure that the sample tracking system is functioning at all times.

5.3.2.3 Data Entry and Storage

The electronic analytical database will be maintained in a format that is capable of performing the requisite management functions that are described in the following paragraphs.

Database Administration

Database administration includes coordination of data entry and verification and review of data for completeness and correctness. The database manager will interface with the project manager, task leaders, and field personnel to ensure that the database meets the project objectives.

Electronic Data Entry

Data received from off-site analytical laboratories in electronic format will be checked for completeness by comparing data received with data analyses requested in the chain-of-custody forms. Electronic files will be logged in, checked to see that the files received match the transmittal paperwork, copied, and archived in the project files.

The electronic data files will be downloaded into temporary database files; this downloading process will be conducted by the database manager. The data from the temporary database files will be printed for review during the data verification process.

During data verification, printouts of the data received in electronic format will be compared with paper copies of the original laboratory reports. In addition, the sample identification number, location, constituent, and qualifier codes will be verified. Upon completion of electronic data verification, the verified files in the temporary analytical database will be incorporated into the analytical database for the project. Are they planning to use a particular software?

Manual Data Entry

Manual data entry will be performed for any analytical data and physical data that is not received in electronic format. The unverified data will be manually entered into the analytical database with results marked as "not verified". Following data verification, the electronic data will be flagged as "verified."

Verification of manually entered data will be performed using the following procedures:

- A listing will be produced of data entered to serve as a checkprint.
- Each record entered into the database will be compared to original coded sheets; correct values will be highlighted, and incorrect values will be marked with revisions in red. The first page of each data listing will be signed and dated by the person completing the comparison.
- Corrections will be made to the database.
- Listings will be produced of data corrected, and the comparison will be repeated (only to corrected values). This procedure will be repeated until corrections are completed.
- Temporary files will be converted to final files.

Archiving of Data

Back up of the electronic database files will be routinely accomplished. Data will be backed up on a weekly basis. Data will be archived at the conclusion of the project, and the files will be maintained in designated locations.

5.3.2.4 Data Presentation

The objective of data presentation is to illustrate the analytical and geologic/hydrogeologic data for each site in formats that facilitate data interpretation. These formats may include both tables and figures, as appropriate.

Analytical Data Presentation

Two types of analytical data presentation will be provided: final tables that will be generated in a format designed for inclusion in the report, and working tables that will be generated for specific uses by the various project personnel. All requests for data output will be submitted to the data manager in a written format, with clear instructions as to the type of output requested.

Examples of tables to be created include:

- Appendix-style (tabular listings sorted by location and sample ID)
- Summary of detected values to be included in the final characterization report
- Site information including measurements of water-table elevation and sample/station location coordinates
- Analytical data including constituents of concern, analyte concentrations, and qualifiers

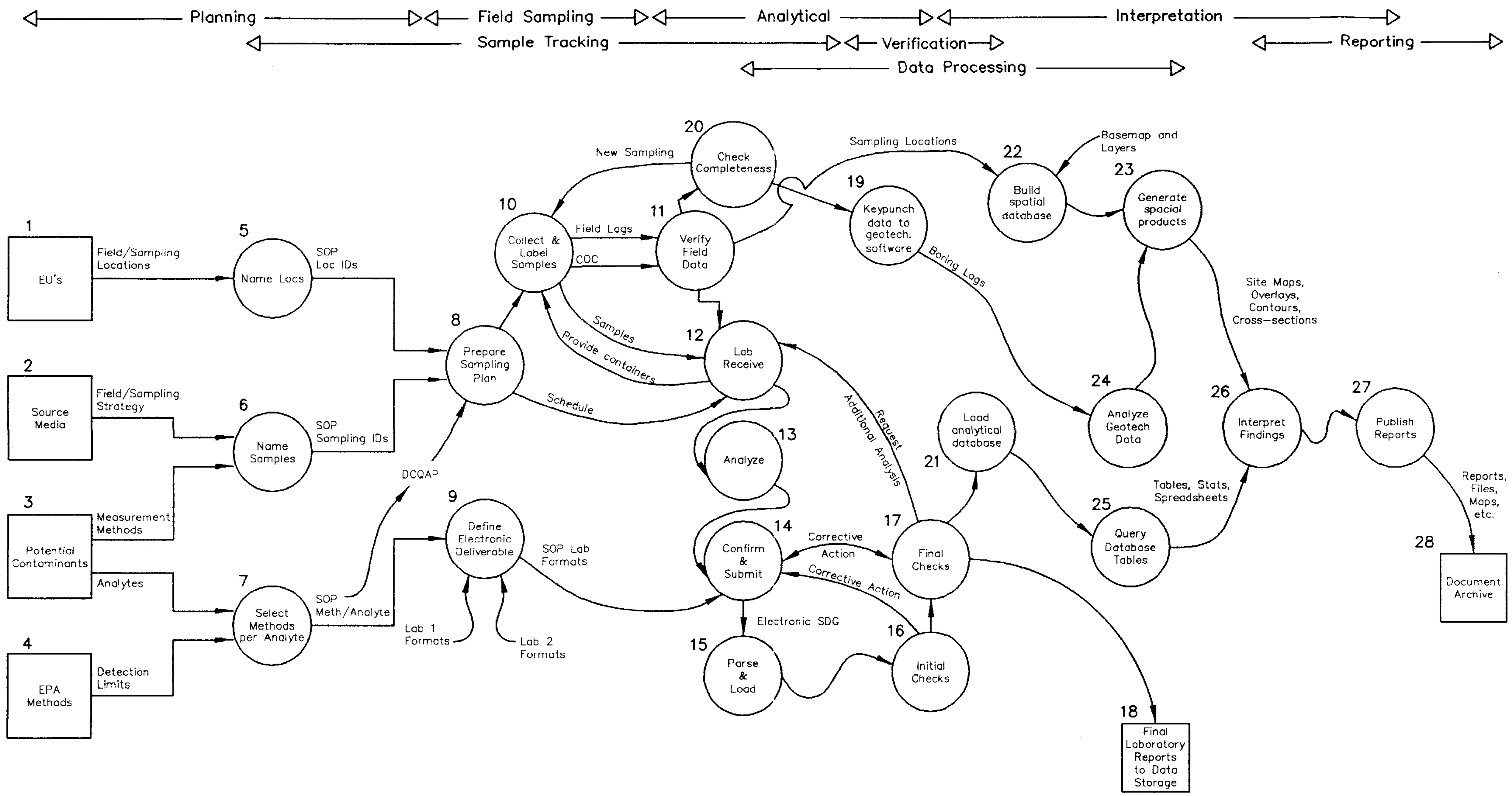
Graphical Data Presentation

Facility base maps will be created using information from the AutoCAD® database. That base map, which will be generated from information derived from a variety of sources, will be used as the base for all computer-generated drawings of the facilities. Types of maps and drawings that will be used to present data or facility information will include:

- Soil and groundwater sampling locations
- Locations of pertinent EUs and facility features
- Water-table and piezometric surface contour maps
- Maps showing the distribution of contaminant concentrations

Information from the AutoCAD® database, including surveyed elevational data, coupled with information from the geologic boring logs and well completion information, will be used to generate geologic cross-sections for each of the sites.

FIGURES



ELEMENTS:

1. Site characteristics defining VCAP purpose
2. Various media to be sampled
3. Array of potential contaminants to be investigated
4. EPA–defined methods and procedures
5. Convention for naming site locations
6. Convention for uniquely referencing each VCAP Sample
7. Protocols to generate results for target analytes
8. Specification of samples to be collected
9. Specification of chemical results for electronic formats
10. Collection of samples or measurements in the field
11. Verification of field measurements
12. Receipt of samples at chemistry labs
13. Chemical analyses underway with data entering Laboratory Information Management System (LIMS)
14. Laboratory preparations of Sample Delivery Groups (SDG)
15. Database group loads electronic SDG into electronic analytical database
16. Database used to check SDG completeness, dates, etc.
17. Verification of chemical results
18. Store laboratory reports in P&W archive.
19. Enter field logs into geotechnical software
20. Check of field information for completeness of sampling
21. Match lab results with verification flags in final analytical database
22. Link basemap elements with data base location IDs
23. Use AutoCAD to portray site conditions
24. Use geotechnical software to depict geotechnical characteristics
25. Query the database for tabular listings
26. Synthesize various results
27. Merge data products with text into final reports
28. Store all products in P&W archive

FIG. 5–1

VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY CONNECTICUT FACILITIES

DATA FLOW DIAGRAM OF DATA MANAGEMENT PROCESSES

Comm.No. 68VC601

Pratt & Whitney A United Technologies Company / LEA

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SECTION 6 - DATA COLLECTION QUALITY ASSURANCE PLAN

6.1 Introduction

This Data Collection Quality Assurance Plan (DCQAP) specifies the quality assurance and quality control procedures that will be implemented in conjunction with field sampling and analysis programs conducted under Pratt & Whitney's Voluntary Corrective Action Program (VCAP). This section presents only those elements of the overall Data Collection Quality Assurance Program that have not been presented in the previous sections of the Work Plan. These topics include the development and presentation of Data Quality Objectives (Section 6.2), Standard Operating Procedures (Section 6.3), Use and Maintenance of Field Equipment and Instrumentation (Section 6.4), Record Keeping Procedures (Section 6.5), and Data Reporting Procedures (Section 6.6).

6.1.1 Purpose and Scope

The Data Collection Quality Assurance Plan provides documentation of procedures that will be used in the sampling and analysis of environmental media during investigations conducted under the VCAP. Adherence to procedures presented in this plan will help ensure consistent quality in the performance and documentation of those tasks that are associated with environmental sampling and subsurface investigations. Review procedures identified in the DCQAP ensure that the activities used in the performance, evaluation, and completion of investigations are consistent with state-of-the-art techniques and provide consistency in operations and reproducibility of results.

The scope of this DCQAP is limited to those activities associated with the collection and analysis of samples of various environmental media. Due to the number and complexity of different sites involved in the VCAP, the standard operating procedures provided in this DCQAP may not cover all possible activities that may be undertaken. This plan provides guidance on the performance of the most common procedures likely to be encountered on a routine basis. Where activities are not covered in the plan, personnel will exercise common sense and sound professional judgment, keeping in mind the overall objectives of the project, regulatory issues, and state-of-the-art practices. As necessary, field personnel will also seek guidance from the project manager or other designated technical personnel.

This DCQAP does not address documentation of laboratory procedures for individual analytical methodologies. It is the responsibility of the laboratory to ensure that procedures used are in accordance with standard practices and regulatory criteria.

6.1.2 Objectives

The objective of the DCQAP is to specify procedures to be used to obtain samples that meet the program objectives of precision, accuracy, representativeness, completeness, and comparability of data. The DCQAP also specifies procedures to be used for documentation, evaluation, and reporting of data collected during the VCAP.

The data collected for Pratt & Whitney's Voluntary Corrective Action Program, supplemented by previously obtained data from each of the facilities, will be used for the following purposes:

- to characterize the physical environment of the site
- to identify potential sources of contamination
- to characterize the type, extent, and degree of contamination at and in the vicinity of identified environmental units (EUs) at the sites
- to determine background concentration levels for contaminants of concern
- to determine potential pathways of contamination from facility EUs.
- to aid in the development and recommendation of media protection standards for media of concern at the site
- to aid in the evaluation of the need for stabilization measures

Groundwater, surface water, sediment, soil and air samples will be collected to qualitatively and quantitatively identify a variety of organic and inorganic constituents for the above purposes. The constituents for which analysis may be conducted are identified in Table 6-1.

6.2 Data Quality Objectives

Data Quality Objectives (DQOs) are quantitative and qualitative statements specifying the quality of the environmental data required to support the decision-making process. Understanding the intended use of the data and analytical capability is an essential aspect of the development of the DQOs, since the DQOs define the uncertainty in the data that is acceptable for each specific sampling activity. This uncertainty includes both sampling error and instrument measurement error. Although zero uncertainty would be the ideal, the variables associated with the collection and analysis process, in both the field and the laboratory, make this ideal unattainable. Understanding this, the objective of the quality assurance program is to keep the total uncertainty within an acceptable range that will not hinder the intended use of the data.

The Data Quality Objectives are procedures for field sample collection and laboratory analysis/reporting that will provide analytical data of known quality. The DQOs specify data quality requirements, such as detection limits, criteria for accuracy and precision, sample representativeness, data comparability, and data completeness. Data quality and quantity are measured by comparison of resulting data with established acceptable limits for data precision, sensitivity, accuracy, representativeness, comparability, and completeness, as described in the U.S. EPA document entitled, *Data Quality Objectives for Remedial Response Activities*. Specifics related to data quality requirements are presented in Section 6.2.1. Quality control procedures for field activities are presented in Section 6.2.2.

6.2.1 Data Quality Requirements

To ensure that the data collected meets the DQOs, many types of field and laboratory QC samples will be required. These samples will include field blanks, trip blanks, laboratory method blanks, field and laboratory duplicates, performance evaluation samples, matrix spikes, and calibration and check standards. VCAP data will be evaluated for the parameters presented in the following sub-sections.

6.2.1.1 Accuracy and Precision

Accuracy is a measure of the agreement between an experimental result and the true value of the parameter being analyzed. Sources of error that may contribute to poor accuracy include:

- laboratory error
- sampling inconsistency
- field and/or laboratory contamination
- sample handling
- matrix interference
- preservation

Sample preparation and analytical accuracy can be determined using known reference materials, or matrix spikes. Matrix spikes are added into the actual sample matrix or the laboratory's surrogate distilled and/or deionized water. By plotting the results of the matrix spike on control charts, a true picture of the process of sample analysis is obtained. This information, used in conjunction with matrix spike recoveries, aids in determining whether out-of-control conditions are due to laboratory problems or sample matrix problems. Laboratory performance is also measured by spiking with surrogate compounds prior to sample preparation.

Accuracy can be expressed as the percent recovery (%R), as determined by the following equation:

$$\%R = \frac{SSR - SR}{SA} \times 100$$

where: SSR = spiked sample result

SR = sample result (native)

SA = spike added

Accuracy will also be assessed through the application of the performance evaluation program described in sub-section 6.2.1.6.

Precision is the measure of agreement or repeatability of a set of duplicate results obtained from repeat determinations made under the same conditions. The precision of a duplicate determination can be expressed as the relative percent difference (RPD), as determined by the following equation:

$$RPD = \frac{|X1 - X2|}{(X1 + X2) \div 2} \times 100$$

where: $X1$ = first duplicate value

$X2$ = second duplicate value

For a given laboratory analysis, the duplicate RPD values are tabulated, and the mean and standard deviation of the RPD are calculated. Control limits for precision are usually plus or minus two standard deviations from the mean. Laboratory precision limits for the analytical work will be those established by EPA, as indicated in Tables 6-2 and 6-3.

Accuracy and precision will be monitored by using field and laboratory duplicates, matrix spike/matrix spike duplicates, laboratory control samples, and field and trip blanks. Acceptable limits for those parameters are identified in Tables 6-2 and 6-3 These data alone cannot be used to evaluate the accuracy and precision of individual samples, but will be used to assess the long-term accuracy and precision of the analytical method.

6.2.1.2 Representativeness

Representativeness is the degree to which sample data accurately and precisely represent parameter variations at a sampling point. Otherwise stated, representativeness is a measure of how closely the measured results reflect the actual distribution and concentration of certain constituents in the medium sampled.

The data quality objective to demonstrate representativeness of aqueous samples for this project will be that the RPD between the results of field duplicates should be less than or equal to 20 percent for results greater than five times the Practical Quantitation Limit (PQL). The difference between results in aqueous field duplicates should be less than the PQL when at least one result is less than or equal to five times the PQL.

For soils, the data quality objective to demonstrate representativeness will be that the RPD between the results of field duplicates of soil samples should be less than or equal to 40 percent for results greater than five times the PQL. The difference between results in field duplicates of soil samples should be less than two times the PQL when at least one result is less than or equal to five times the PQL.

To ensure representativeness, an adequate number of sampling locations will be specified for each facility sampling plan, and the sampling methods will be consistent at each facility. Sample collection and handling procedures are described in the standard operating procedures (SOPs) presented in Appendix G. Documentation of field and laboratory procedures will be used to establish that protocols have been followed and that sample identification and integrity have been maintained. These procedures will generate samples that are as representative as possible.

6.2.1.3 Completeness

Completeness is defined as the percentage of analytical measurements that are judged to be valid compared to the total number of measurements. Percent completeness is calculated as the number of valid analyses divided by the total number of analyses performed, multiplied by 100. The completeness objective for this project will be to obtain valid analytical results for a minimum of 85 percent of the samples collected.

6.2.1.4 Comparability

Comparability expresses the confidence with which one data set can be compared with another data set from a different sampling phase or from a different program. Comparability involves a composite of the above parameters, as well as design factors such as sampling and analytical protocols. An acceptable level of comparability will be accomplished through the consistent use of accepted analytical and sampling methods. The comparability criterion becomes important if more than one field team is collecting samples or if more than one laboratory is analyzing the samples.

6.2.1.5 Detection and Practical Quantitation Limits

The detection limits for the analytical methods are as defined *by Test Methods for Evaluating Solid Waste SW-846*, Third Edition, December, 1986 and *Standard Methods for the Examination of Water and Wastewater*, 16th Edition, 1985. The practical quantitation limits (PQLs) that will be used for analyses conducted during the VCAP are presented in Table 6-1 for each of the parameters for which analysis may be conducted.

6.2.1.6 Performance Evaluation Program

To ensure that environmental data collection activities result in the delivery of analytical data of known and documented quality that is suitable for its intended use, single and/or double blind Performance Evaluation (PE) samples, obtained from commercial vendors, will be used during the project. Use of the PE samples will be in accordance with *EPA Region I Performance Evaluation Program Guidance*, dated July 1996. The EPA Region I PE Program serves three major functions:

- To identify a community of technically capable laboratories during laboratory pre-award evaluations
- To evaluate the performance of analytical laboratories over a period of time
- To provide information on a laboratory's ability to accurately identify and quantitate analytes of interest during the period of sample preparation and analysis

The following PE Program requirements will be used during the VCAP:

- One single or double blind PE sample will be used for each sample matrix, analysis parameter, and concentration level for each Sample Delivery Group (SDG) that is sent to a laboratory. An SDG is defined as a group of 20 or fewer field samples within a project, received over a period of up to 14 calendar days. The PE samples will be counted as field samples in the SDG total 20 samples.
- PE samples will be used for all analytical testing when they are available from commercial vendors in the appropriate matrix and at the proper concentration level. Additionally, PE samples will contain as many target analytes as possible, but will contain at least one of the target analytes, preferably a contaminant of concern at the site.

For soil/sediment/solid sampling events where the only aqueous samples are equipment and/or trip blanks, an aqueous PE sample will only be included when a soil/sediment/solid PE sample does not exist from a commercial vendor for that analytical parameter.

6.2.2 Field Quality Control

The field quality control procedures are used to monitor the data quality as it is affected by field procedures and conditions. As discussed below, a variety of duplicates and blanks will be used to assess field procedures.

6.2.2.1 Duplicates and Blanks

Duplicate samples will be used to provide a measure of the internal consistency of the sample and an estimate of variance and bias. Duplicate samples will be collected at a rate of one duplicate for every 20 or fewer samples per medium. The duplicate samples will be collected concurrently with the actual samples in exactly equal volumes, at the same location, with the same sampling equipment, and in identical containers. The duplicate samples will be preserved and handled in the same manner as the actual samples. The actual sample will be labeled with the sample location number; the duplicate with a different number.

Equipment blanks will be analyzed to provide a measure of the decontamination efficiency and other potential errors that can be introduced from sources other than the sample. Trip blanks will indicate whether contamination occurs during shipment and storage. Trip blanks will accompany the shipments of samples to be analyzed for volatile organic compounds (VOCs) each day volatiles are shipped. The frequency of field QC sampling is indicated in Table 6-4 and is described in detail in the respective SOPs for Soil Sampling and Groundwater Sampling included in Appendix G. Sample container requirements, preservation requirements and holding times are indicated in Table 6-5.

6.2.2.2 Field Measurements

Field measurements, including those for pH, oxidation/reduction potential, dissolved oxygen, specific conductance, and temperature, produce QA concerns even though sample collection is not required. The primary QA objective for field measurements is to obtain reproducible measurements with a degree of accuracy consistent with the limitations of the analytical techniques and with the intended use of the data. Procedures for field measurements, equipment calibration (where appropriate), and equipment maintenance are documented in sub-section 6.4 and in the individual SOPs.

6.3 Standard Operating Procedures

6.3.1 General

Standard operating procedures (SOPs) have been developed for several of the most common procedures associated with the monitoring, sampling, and analysis of various media for environmental investigations. Development of these SOPs has taken into account the need for data precision, accuracy, representativeness, comparability, and completeness.

Although it is understood that there are limits on data accuracy and precision that are inherent in the collection and analysis of samples and in the operation of measuring devices, adherence to standard procedures will increase consistency and the level of confidence with which the data collected is evaluated. Data collected under standard procedures can also be used more reliably in comparing results over time on a given project or from other projects or to published information.

Data evaluation is also dependent upon the representativeness of the samples or measurements collected and the completeness of information associated with collection of the data. Collection and measurement techniques identified in the SOPs have been designed to take these factors into account, thus increasing the level of confidence that can be placed in the data.

Understanding that adherence to standard operating procedures is imperative for the successful completion of any project, there will be instances where exceptions to the SOPs must be made to obtain reliable data. When exceptions are made, documentation of both the situation requiring deviation and the actual deviation in procedure will be provided.

In instances where it is known prior to performance of a task that adaptations to the SOPs will be necessary, a project-specific revision to the appropriate SOP(s) will be developed and included in the project file. The revised SOP will also include the specific justifications for revising the original SOP. If conditions are encountered in the field which necessitate changes to an SOP(s) on a site-specific basis, those conditions will be documented, and the specific changes to standard procedures will be noted in detail in the field documentation records. If feasible, the project manager and/or company Quality Assurance/Quality Control Coordinator will be contacted prior to implementing any changes to the SOPs.

For those activities that will be performed by subcontractors, it will be required that those entities provide copies of their own SOPs for the tasks for which they will be responsible.

6.3.2 Development of Standard Operating Procedures

Each SOP was developed by personnel experienced in the performance of the specific activity. At least two senior-level people, one an officer of the company, reviewed the SOP to ensure that the identified procedures satisfy the stated objectives and that the prescribed procedures are technically correct, appropriately applied, and in conformance with applicable regulatory criteria and standard practices. These individuals signified their approval by signing and dating the SOP.

Over time, standard practices and state-of-the-art techniques and equipment may change. SOPs must be reviewed and updated as necessary to reflect these changes. Review of all SOPs on a periodic basis is performed to ensure that all procedures used in the performance of environmental investigations are as up-to-date as possible. Each revision will be approved, signed, and dated by authorized personnel, as noted above. Whether or not revisions were made, and a record of the dates on which reviews of SOPs were conducted, will be kept by the project's Quality Assurance/Quality Control Coordinator or other officially designated staff member.

Standard Operating Procedures for the following activities have been included in Appendix G of this Work Plan:

- Soil Sampling
- Hand Auger Borings
- Hollow Stem Auger Soil Borings
- Geoprobe® Probing and Sampling
- Geoprobe® Screen Point Groundwater Sampling
- Geologic Logging of Unconsolidated Sedimentary Materials
- Rock Coring
- Installing and Developing Monitoring Wells and Piezometers
- Liquid Sample Collection and Field Analysis
- Soil Vapor Surveying
- Performing Slug/Bail Tests
- Conducting Step-Drawdown Pumping Tests
- Conducting Constant Rate Dumping and Recovery Tests
- Sediment Sampling in Shallow Rivers and Ponds
- Shallow Surface Water Sampling and Flow Measurement
- Quality Assurance/Quality Control Measures for Field Activities
- Operation of the Portable Gas Chromatograph
- Sample Management Associated With the LEA Analytical Laboratory

6.3.3 Quality Assurance Procedures

6.3.3.1 Personnel Training

To ensure that procedures are performed in accordance with standard operating procedures, all personnel will be provided with copies of the applicable SOPs prior to commencement of work. Project meetings will be held prior to initiation of field activities at each of the facilities to enhance understanding of personnel roles and coordination of activities. Those meetings will include a review of all SOPs and field coordination activities that will be used on the project and any necessary training on specific procedures or equipment for personnel who are unfamiliar with the activities.

The project manager will be responsible for ensuring that assigned personnel are familiar with the activity/SOP or are instructed by experienced personnel prior to undertaking the work. Unless the activity can be adequately learned during office training procedures, personnel requiring training will be used as assistants prior to performing tasks themselves.

When joining the company, new personnel will be given copies of SOPs and will be provided with appropriate training. As revisions to SOPs are made and approved, all personnel involved in those activities will be apprised of the changes and provided with copies of the revised SOPs, as appropriate.

6.3.3.2 Field Audits

Performance audits will be conducted periodically during the course of activities at each facility to verify that standard operating procedures, record-keeping, and custody procedures are being followed. Verification that sampling and monitoring data are collected, documented, and maintained in a consistent fashion throughout the course of the investigation is necessary to maintain the validity and reliability of the data.

Field audits will be conducted by authorized personnel who are familiar with all procedures used on the project. Audit frequency and timing, as well as the identification of project-specific issues or questions that will be included in the audit, will be dependent on the nature and complexity of each field investigation and will be identified in the facility-specific sampling plans. However, all field audits will be designed to verify whether the following activities are taking place:

- Standard operating procedures for the collection of samples and monitoring of environmental media are being followed.

- Chain-of-custody procedures for traceability of sample handling and origin are being followed.
- Specified equipment is available, calibrated, and in working order.
- Sampling crews are adequately trained.
- Record-keeping procedures are being followed.
- Any wastes generated during the performance of field activities are being handled in accordance with applicable laws, regulations, and Pratt & Whitney best management practices.

A Field Performance and Audit Checklist will be completed by the individual performing the audit. Although a project-specific checklist will be developed for each facility, the Field Performance and Audit Checklist will contain, at a minimum, the questions contained in the sample checklists included in Appendix H. An audit report will be prepared summarizing the results of the audit and any corrective actions that were necessary. The report will also note any significant variances from established procedures. Both the Field Performance and Audit Checklist and the Audit Report will be maintained as part of the project file.

6.4 Use and Maintenance of Field Equipment and Instrumentation

6.4.1 Use and Maintenance

All field equipment and instruments will be operated and maintained in a manner that is consistent with the manufacturer's recommended practices. Any deviations from standard use of the equipment or required repairs or adaptations made in the field must be noted in the field record and/or field log book. Operation and maintenance manuals for all equipment are to be kept in a single location known and accessible to all personnel likely to use the equipment.

Field personnel must return equipment in a condition that will permit its optimal use on the following day of field operations or notify appropriate personnel so repairs/replacements can be arranged in an expedient fashion. The use of expendable equipment must be recorded and reported to authorized personnel so replacements can be ordered in a timely manner and an adequate supply is always available.

Prior to initiation of a project, the field services manager or designated personnel will ensure that adequate supplies and equipment are available for project completion. It is the responsibility of field personnel to inform the field services manager or other authorized personnel that supplies are depleted and re-ordering will be necessary.

6.4.2 Calibration Procedures and Frequency

Instruments and equipment will be calibrated with sufficient frequency, and in such a manner, that accuracy and reproducibility of results are consistent with the appropriate manufacturer's specifications or project-specific requirements. Calibration will be performed at intervals recommended by the manufacturer or more frequently, as conditions dictate. Field instruments that require calibration include: pH, specific conductance, temperature, and dissolved oxygen meters; turbidimeter; organic vapor analyzers; explosive gas/oxygen meters; velocity meters; and portable gas chromatographs.

Documentation and results of instrument calibration will be noted on the Instrument Calibration Check Form. This form, documents calibration of each instrument at the beginning and end of each day of use (except as noted in the manufacturer's instructions). Instrument-specific calibration requirements are included in the appropriate SOPs. Calibration of health and safety equipment is included in the Health and Safety Plan.

6.5 Record keeping Procedures

6.5.1 Office Documentation

All documentation related to project activities, including field activities, will be maintained by the project manager until completion of the project. Records will be maintained in a project notebook or other suitable format to ensure their organization and accessibility.

6.5.2 Field Documentation

Records that will be maintained as documentation of field activities include field logbooks, daily field report forms, field quality review checklists, field instrumentation and quality assurance records, field sampling records, data collection records from groundwater monitoring and sampling, well development reports, soil gas survey data records, boring and test pit logs, and chains-of-custody for collected samples. Examples of all field forms are included in Appendix I. All appropriate documentation will be completed in the field and returned to the office for inclusion in the project file. At a minimum, field logbooks, daily field report forms, and field quality review checklists must be completed for each day of field activity.

In addition to the field forms referenced above, field logbooks or notebooks will be used to record general field data collection activities or pertinent field observation or occurrences. Entries will be made in waterproof ink and each page will be numbered. Each daily entry will include the following information:

- name of person recording information
- names of all field personnel
- project name and number
- date
- start and end times
- weather conditions

Other information that will be recorded in the field logbook includes the level of personal protective equipment used, difficulties, accidents, incidents, equipment problems or malfunctions, or deviations from the work plan.

Any corrections made in the field logbook will be crossed out, not erased, and initialed and dated by the person making the correction. Each page of the logbook will be signed by the person responsible for recording information on that day. All lines on a page, and all pages, should be used. A notation will be made on the final page of a day's entry indicating it as such.

6.5.3 Sample Labeling and Custody

Prior to sample collection, project-specific sample numbers will be obtained, and labels completed with all required information, as noted in the sample collection SOPs (Appendix G). Each sample will be labeled using waterproof ink, or a computer-generated label, and sealed immediately after collection. At a minimum, each sample label will have the following information:

- job site
- job number
- date
- sample number
- time of sample collection
- type of analysis to be performed
- any preservatives used

Sample labels and tags must remain fixed to the sample container. The sampler must ensure that the sample container is dry enough for the label to remain securely attached or use a rubber band or string when gummed labels are not applicable or there is any question as to whether the gummed label would be secure.

All sampling information will be recorded on the field sampling record (Appendix I). Written chain-of-custody procedures must be followed whenever samples are collected, transferred, stored, analyzed, or destroyed. The objective of these procedures is to create an accurate written record that can be used to trace the possession and handling of the sample from its collection through analysis.

A sample is determined to be in someone's "custody" under any of the following conditions:

- it is in one's actual possession;
- it is in one's view, after being in one's physical possession;
- it is placed and kept in a locked location after being in one's physical possession; or
- it is kept in a secured area that is restricted to authorized personnel only.

Each time sample custody changes hands, the chain-of-custody form will indicate that change. All efforts will be made to limit the number of people involved in the collection and handling of samples. Examples of chain-of-custody forms are included in Appendix I. All information requested on that form will be completed for each sample.

For field operations that involve several field crews or sampling teams, one person will be designed as the Field Sampling Coordinator. The Field Sampling Coordinator is responsible for properly packaging and dispatching samples to the laboratory. This includes completing, dating, and signing the appropriate portion of the chain-of-custody record. As samples are transferred, the transferee must record the date and time and sign the chain-of-custody record. Custody transfers made to the Field Sampling Coordinator should account for each sample, although samples may be transferred as a group.

All packages of samples sent to the laboratory will be accompanied by the chain-of-custody record and any other necessary forms. A copy of these forms will be maintained in the project file for the specific facility. Receipts from mailing or transport of the samples will also be maintained as part of the permanent chain-of-custody documentation. Prior to transport, all packages of samples should be affixed with a chain-of-custody seal. A broken seal will alert the recipient of the package that the chain-of-custody had been broken. In this event, the project manager will be notified and will order appropriate corrective action, if any.

6.5.4 Archiving

Following completion of any project, all records associated with that project including reports, project notebooks, field records and logbooks, and laboratory reports and chains-of-custody will be archived in a manner that will permit their efficient retrieval should reference to the documents be required in the future. Files will be maintained by project commission number.

6.6 Data Verification

An initial review of data obtained from field measurements will be performed by the Field Task Leader. This review will consist of checking procedures utilized in the field, ensuring that field measurement instruments were properly calibrated, verifying the accuracy of transcriptions, and comparing data obtained in the field to historic measurements. An independent review of these parameters will be provided by a qualified person who was not involved with the field task.

An internal review of analytical data will be the responsibility of laboratory personnel. The analyst will initiate the data review process by examining and accepting the data. The completed data package will then be reviewed by the data reviewer. The data reviewer will provide a technical review for accuracy and precision according to the methods employed and laboratory protocols. The data package will also be reviewed for completeness (i.e., all pertinent information is included, all appropriate forms are signed and dated, calculations are correct, and holding times and QC sample acceptance criteria have been met). A final review of the data will be completed by the Laboratory Project Manager to ensure that the data package meets the project specifications.

The following elements will be reviewed for all samples (if applicable to the method):

- Holding times
- Blanks
- Field duplicates
- Surrogates
- MS/MSDs or MS/laboratory duplicates
- Internal standards
- Laboratory control samples

6.6.1 Data Reporting and Qualification Procedures

Standard data qualifiers will be used to classify data according to conformance to QA/QC requirements. Specific qualifiers will be defined when standard qualifiers are not applicable. Where appropriate, the significance of data qualifiers will be explained (e.g., low bias, poor precision, poor recovery). The following are commonly used data qualifiers:

U Constituent was analyzed for, but it was not detected. The associated numerical value is the sample quantitation limit or sample detection limit (approximate sample concentration necessary for detection).

J Associated numerical value is an estimated quantity. Constituent is present, but reported value may not be accurate or precise.

K Constituent is present, but its reported value may be biased high. The actual value is expected to be lower.

L Constituent is present, but its reported value may be biased low. The actual value is expected to be higher.

R Data is unusable. The compound may or may not be present, Resampling and re-analysis (or supporting data) are necessary for verification.

UJ Constituent was analyzed for, but it was not detected. The sample quantitation limit is an estimated quantity. The quantitation limit may be inaccurate or imprecise.

UL Constituent was analyzed for, but it was not detected. Quantitation limit is probably higher.

B Not detected substantially above the level reported in laboratory or field blanks.

Q No analytical result.

TABLES

Table 6-1
PRACTICAL QUANTITATION LIMITS FOR CONSTITUENTS FOR WHICH ANALYSIS MAY BE CONDUCTED

CAS#	Analyte Name	Fraction	Project Quantitation Limits			Soil	Units
			Method	Aqueous	Units		
67-64-1	Acetone	VOA	SW846-8240A	100.0	ug/l	100.0	ug/kg
71-43-2	Benzene	VOA	SW846-8240A	5.0	ug/l	5.0	ug/kg
75-27-4	Bromodichloromethane	VOA	SW846-8240A	5.0	ug/l	5.0	ug/kg
75-25-2	Bromoform	VOA	SW846-8240A	5.0	ug/l	5.0	ug/kg
74-83-9	Methyl bromide	VOA	SW846-8240A	10.0	ug/l	10.0	ug/kg
78-93-3	Methyl ethyl ketone	VOA	SW846-8240A	100.0	ug/l	100.0	ug/kg
75-15-0	Carbon disulfide	VOA	SW846-8240A	10.0	ug/l	10.0	ug/kg
56-23-5	Carbon tetrachloride	VOA	SW846-8240A	5.0	ug/l	5.0	ug/kg
108-90-7	Chlorobenzene	VOA	SW846-8240A	5.0	ug/l	5.0	ug/kg
75-00-3	Chloroethane	VOA	SW846-8240A	10.0	ug/l	10.0	ug/kg
67-66-3	Chloroform	VOA	SW846-8240A	5.0	ug/l	5.0	ug/kg
74-87-3	Methyl chloride	VOA	SW846-8240A	10.0	ug/l	10.0	ug/kg
124-48-1	Chlorodibromomethane	VOA	SW846-8240A	5.0	ug/l	5.0	ug/kg
75-34-3	1,1-Dichloroethane	VOA	SW846-8240A	5.0	ug/l	5.0	ug/kg
107-06-2	1,2-Dichloroethane	VOA	SW846-8240A	5.0	ug/l	5.0	ug/kg
75-35-4	1,1-Dichloroethane	VOA	SW846-8240A	5.0	ug/l	5.0	ug/kg
540-59-0	1,2-Dichloroethane (total)	VOA	SW846-8240A	5.0	ug/l	5.0	ug/kg
78-87-5	1,2-Dichloropropane	VOA	SW846-8240A	5.0	ug/l	5.0	ug/kg
10061-01-5	cis-1,3-Dichloropropene	VOA	SW846-8240A	5.0	ug/l	5.0	ug/kg
10061-02-6	trans-1,3-Dichloropropene	VOA	SW846-8240A	5.0	ug/l	5.0	ug/kg
100-41-4	Ethylbenzene	VOA	SW846-8240A	5.0	ug/l	5.0	ug/kg
591-78-6	Methyl butyl ketone	VOA	SW846-8240A	50.0	ug/l	50.0	ug/kg
126-98-7	Methacrylonitrile	VOA	SW846-8240A	100.0	ug/l	100.0	ug/kg
75-09-2	Methylene chloride	VOA	SW846-8240A	5.0	ug/l	5.0	ug/kg
108-10-1	Methyl isobutyl ketone	VOA	SW846-8240A	50.0	ug/l	50.0	ug/kg
100-42-5	Styrene	VOA	SW846-8240A	5.0	ug/l	5.0	ug/kg
79-34-5	1,1,2,2-Tetrachloroethane	VOA	SW846-8240A	5.0	ug/l	5.0	ug/kg
127-18-4	Tetrachloroethene	VOA	SW846-8240A	5.0	ug/l	5.0	ug/kg
108-88-3	Toluene	VOA	SW846-8240A	5.0	ug/l	5.0	ug/kg
71-55-6	1,1,1-Trichloroethane	VOA	SW846-8240A	5.0	ug/l	5.0	ug/kg
79-00-5	1,1,2-Trichloroethane	VOA	SW846-8240A	5.0	ug/l	5.0	ug/kg
79-01-6	Trichloroethene	VOA	SW846-8240A	5.0	ug/l	5.0	ug/kg
75-01-4	Vinyl chloride	VOA	SW846-8240A	10.0	ug/l	10.0	ug/kg
1330-20-7	Xylenes (total)	VOA	SW846-8240A	5.0	ug/l	5.0	ug/kg
95-50-1	1,2-Dichlorobenzene	VOA	TO-14	NA	NA	NA	NA
541-73-1	1,3-Dichlorobenzene	VOA	TO-14	NA	NA	NA	NA
106-46-7	1,4-Dichlorobenzene	VOA	TO-14	NA	NA	NA	NA
87-68-3	Hexachlorobutadiene	VOA	TO-14	NA	NA	NA	NA
67-64-1	Acetone	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
71-43-2	Benzene	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
75-27-4	Bromodichloromethane	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
75-25-2	Bromoform	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
74-83-9	Methyl bromide	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
78-93-3	Methyl ethyl ketone	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
56-23-5	Carbon tetrachloride	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
108-90-7	Chlorobenzene	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
75-00-3	Chloroethane	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
67-66-3	Chloroform	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
74-87-3	Methyl chloride	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
124-48-1	Chlorodibromomethane	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg

Table 6-1
PRACTICAL QUANTITATION LIMITS FOR CONSTITUENTS FOR WHICH ANALYSIS MAY BE CONDUCTED

			Project Quantitation Limits				
CAS#	Analyte Name	Fraction	Method	Aqueous	Units	Soil	Units
75-34-3	1,1-Dichloroethane	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
107-06-2	1,2-Dichloroethane	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
75-35-4	1,1-Dichloroethane	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
540-59-0	1,2-Dichloroethane (total)	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
78-87-5	1,2-Dichloropropane	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
10061-01-5	cis-1,3-Dichloropropene	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
10061-02-6	trans-1,3-Dichloropropene	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
100-41-4	Ethylbenzene	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
75-09-2	Methylene chloride	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
100-42-5	Styrene	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
79-34-5	1,1,2,2-Tetrachloroethane	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
127-18-4	Tetrachloroethene	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
108-88-3	Toluene	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
71-55-6	1,1,1-Trichloroethane	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
79-00-5	1,1,2-Trichloroethane	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
79-01-6	Trichloroethene	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
75-01-4	Vinyl chloride	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
1330-20-7	Xylenes (total)	VOA	SW846-8010B/8020A	NA	NA	20.0	ug/kg
83-32-9	Acenaphthene	SV	SW846-8270A	10	ug/l	330	ug/kg
208-96-8	Acenaphthylene	SV	SW846-8270A	10	ug/l	330	ug/kg
120-12-7	Anthracene	SV	SW846-8270A	10	ug/l	330	ug/kg
56-55-3	Benzo[a]anthracene	SV	SW846-8270A	10	ug/l	330	ug/kg
205-99-2	Benzo[b]fluoranthene	SV	SW846-8270A	10	ug/l	330	ug/kg
207-08-9	Benzo[k]fluoranthene	SV	SW846-8270A	10	ug/l	330	ug/kg
191-24-2	Benzo[ghi]perylene	SV	SW846-8270A	10	ug/l	330	ug/kg
50-32-8	Benzo[a]pyrene	SV	SW846-8270A	10	ug/l	330	ug/kg
111-91-1	bis(2-Chloroethoxy) methane	SV	SW846-8270A	10	ug/l	330	ug/kg
111-44-4	bis(2-Chloroethyl)ether	SV	SW846-8270A	10	ug/l	330	ug/kg
108-60-1	bis(2-Chloroisopropyl)ether	SV	SW846-8270A	10	ug/l	330	ug/kg
117-81-7	bis(2-Ethylhexyl)phthalate	SV	SW846-8270A	10	ug/l	330	ug/kg
101-55-3	4-Bromophenyl phenyl ether	SV	SW846-8270A	10	ug/l	330	ug/kg
85-68-7	Butyl benzyl phthalate	SV	SW846-8270A	10	ug/l	330	ug/kg
106-47-8	4-Chloroaniline	SV	SW846-8270A	10	ug/l	330	ug/kg
59-50-7	4-Chloro-3-methylphenol	SV	SW846-8270A	10	ug/l	330	ug/kg
91-58-7	2-Chlronaphthalene	SV	SW846-8270A	10	ug/l	330	ug/kg
95-57-8	2-Chlorophenol	SV	SW846-8270A	10	ug/l	330	ug/kg
7005-72-3	4-Chlorophenyl phenyl ether	SV	SW846-8270A	10	ug/l	330	ug/kg
218-01-9	Chrysene	SV	SW846-8270A	10	ug/l	330	ug/kg
132-64-9	Dibenzofuran	SV	SW846-8270A	10	ug/l	330	ug/kg
84-74-2	Di-n-butyl phthalate	SV	SW846-8270A	10	ug/l	330	ug/kg
53-70-3	Dibenz[a,h]anthracene	SV	SW846-8270A	10	ug/l	330	ug/kg
95-50-1	1,2-Dichlorobenzene	SV	SW846-8270A	10	ug/l	330	ug/kg
541-73-1	1,3-Dichlorobenzene	SV	SW846-8270A	10	ug/l	330	ug/kg
106-46-7	1,4-Dichlorobenzene	SV	SW846-8270A	10	ug/l	330	ug/kg
91-94-1	3,3-Dichlorobenzidine	SV	SW846-8270A	20	ug/l	670	ug/kg
120-83-2	2,4-Dichlorophenol	SV	SW846-8270A	10	ug/l	330	ug/kg
84-66-2	Diethyl phthalate	SV	SW846-8270A	10	ug/l	330	ug/kg
105-67-9	2,4-Dimethylphenol	SV	SW846-8270A	10	ug/l	330	ug/kg
131-11-3	Dimethyl phthalate	SV	SW846-8270A	10	ug/l	330	ug/kg
534-52-1	4,6-Dinitro-2-methylphenol	SV	SW846-8270A	25	ug/l	830	ug/kg

Table 6-1
PRACTICAL QUANTITATION LIMITS FOR CONSTITUENTS FOR WHICH ANALYSIS MAY BE CONDUCTED

CAS#	Analyte Name	Fraction	Project Quantitation Limits			Soil	Units
			Method	Aqueous	Units		
51-28-5	2,4-Dinitrophenol	SV	SW846-8270A	25	ug/l	830	ug/kg
121-14-2	2,4-Dinitrotoluene	SV	SW846-8270A	10	ug/l	330	ug/kg
606-20-2	2,6-Dinitrotoluene	SV	SW846-8270A	10	ug/l	330	ug/kg
117-84-0	Di-n-octyl phthalate	SV	SW846-8270A	10	ug/l	330	ug/kg
206-44-0	Fluoranthene	SV	SW846-8270A	10	ug/l	330	ug/kg
86-73-7	Fluorene	SV	SW846-8270A	10	ug/l	330	ug/kg
118-74-1	Hexachlorobenzene	SV	SW846-8270A	10	ug/l	330	ug/kg
87-68-3	Hexachlorobutadiene	SV	SW846-8270A	10	ug/l	330	ug/kg
77-47-4	Hexachlorocyclopentadiene	SV	SW846-8270A	10	ug/l	330	ug/kg
67-72-1	Hexachloroethane	SV	SW846-8270A	10	ug/l	330	ug/kg
193-39-5	Indeno(1,2,3-cd)pyrene	SV	SW846-8270A	10	ug/l	330	ug/kg
78-59-1	Isophorone	SV	SW846-8270A	10	ug/l	330	ug/kg
91-57-6	2-Methylnaphthalene	SV	SW846-8270A	10	ug/l	330	ug/kg
95-48-7	2-Methylphenol	SV	SW846-8270A	10	ug/l	330	ug/kg
91-20-3	Naphthalene	SV	SW846-8270A	10	ug/l	330	ug/kg
88-74-4	2-Nitroaniline	SV	SW846-8270A	10	ug/l	330	ug/kg
99-09-2	3-Nitroaniline	SV	SW846-8270A	10	ug/l	330	ug/kg
100-01-6	4-Nitroaniline	SV	SW846-8270A	10	ug/l	330	ug/kg
98-95-3	Nitrobenzene	SV	SW846-8270A	10	ug/l	330	ug/kg
88-75-5	2-Nitrophenol	SV	SW846-8270A	10	ug/l	330	ug/kg
100-02-7	4-Nitrophenol	SV	SW846-8270A	25	ug/l	830	ug/kg
86-30-6	N-Nitrosodiphenylamine	SV	SW846-8270A	10	ug/l	330	ug/kg
621-64-7	N-Nitrosodipropylamine	SV	SW846-8270A	10	ug/l	330	ug/kg
87-86-5	Pentachlorophenol	SV	SW846-8270A	25	ug/l	830	ug/kg
85-01-8	Phenanthrene	SV	SW846-8270A	10	ug/l	330	ug/kg
108-95-2	Phenol	SV	SW846-8270A	10	ug/l	330	ug/kg
129-00-0	Pyrene	SV	SW846-8270A	10	ug/l	330	ug/kg
120-82-1	1,2,4-Trichlorobenzene	SV	SW846-8270A	10	ug/l	330	ug/kg
95-95-4	2,4,5-Trichlorophenol	SV	SW846-8270A	10	ug/l	330	ug/kg
88-06-2	2,4,6-Trichlorophenol	SV	SW846-8270A	10	ug/l	330	ug/kg
86-74-8	Carbazole	SV	SW846-8270A	10	ug/l	330	ug/kg
309-00-2	Aldrin	OCP	SW846-8080A	0.05	ug/l	1.7	ug/kg
319-84-6	alpha-BHC	OCP	SW846-8080A	0.05	ug/l	1.7	ug/kg
319-85-7	beta-BHC	OCP	SW846-8080A	0.05	ug/l	1.7	ug/kg
319-86-8	delta-BHC	OCP	SW846-8080A	0.05	ug/l	1.7	ug/kg
58-89-9	gamma-BHC/Lindane	OCP	SW846-8080A	0.05	ug/l	1.7	ug/kg
72-54-8	4,4-DDD	OCP	SW846-8080A	0.1	ug/l	3.3	ug/kg
72-55-9	4,4-DDE	OCP	SW846-8080A	0.1	ug/l	3.3	ug/kg
50-29-3	4,4-DDt	OCP	SW846-8080A	0.1	ug/l	3.3	ug/kg
60-57-1	Dieldrin	OCP	SW846-8080A	0.1	ug/l	3.3	ug/kg
959-98-8	Endosulfan I	OCP	SW846-8080A	0.05	ug/l	1.7	ug/kg
33213-65-9	Endosulfan II	OCP	SW846-8080A	0.1	ug/l	3.3	ug/kg
1031-07-8	Endosulfan sulfate	OCP	SW846-8080A	0.1	ug/l	3.3	ug/kg
72-20-8	Endrin	OCP	SW846-8080A	0.1	ug/l	3.3	ug/kg
7421-93-4	Endrin aldehyde	OCP	SW846-8080A	0.1	ug/l	3.3	ug/kg
76-44-8	Heptachlor	OCP	SW846-8080A	0.05	ug/l	1.7	ug/kg
1024-57-3	Heptachlor epoxide	OCP	SW846-8080A	0.05	ug/l	1.7	ug/kg
72-43-5	Methoxychlor	OCP	SW846-8080A	0.5	ug/l	17.0	ug/kg
8001-35-2	Toxaphene	OCP	SW846-8080A	5.0	ug/l	170	ug/kg
12674-11-2	Aroclor-1016	OCP	SW846-8080A	1.0	ug/l	33	ug/kg

Table 6-1
PRACTICAL QUANTITATION LIMITS FOR CONSTITUENTS FOR WHICH ANALYSIS MAY BE CONDUCTED

CAS#	Analyte Name	Fraction	Project Quantitation Limits Method	Aqueous	Units	Soil	Units
11104-28-2	Aroclor-1221	OCP	SW846-8080A	2.0	ug/l	67	ug/kg
11141-16-5	Aroclor-1232	OCP	SW846-8080A	1.0	ug/l	33	ug/kg
53469-21-9	Aroclor-1242	OCP	SW846-8080A	1.0	ug/l	33	ug/kg
12672-29-6	Aroclor-1248	OCP	SW846-8080A	1.0	ug/l	33	ug/kg
11097-69-1	Aroclor-1254	OCP	SW846-8080A	1.0	ug/l	33	ug/kg
11096-82-5	Aroclor-1260	OCP	SW846-8080A	1.0	ug/l	33	ug/kg
5103-71-9	alpha-Chlordane	OCP	SW846-8080A	0.05	ug/l	1.7	ug/kg
5103-74-2	gamma-Chlordane	OCP	SW846-8080A	0.05	ug/l	1.7	ug/kg
53494-70-5	Endrin ketone	OCP	SW846-8080A	0.1	ug/l	3.3	ug/kg
1-33-1	Total-TCDD	Diox/F	SW846 8280	0.2	ng/l	0.02	ng/g
1746-01-6	2378-TCDD	Diox/F	SW846 8280	0.2	ng/l	0.02	ng/g
1-33-2	Total-TCDF	Diox/F	SW846 8280	0.2	ng/l	0.02	ng/g
51207-31-9	2378-TCDF	Diox/F	SW846 8280	0.2	ng/l	0.02	ng/g
1-28-9	Total PeCDD	Diox/F	SW846 8280	0.2	ng/l	0.02	ng/g
40321-76-4	12378-PeCDD	Diox/F	SW846 8280	0.2	ng/l	0.02	ng/g
1-29-0	Total PeCDF	Diox/F	SW846 8280	0.2	ng/l	0.02	ng/g
57117-41-6	123478-PeCDF	Diox/F	SW846 8280	0.2	ng/l	0.02	ng/g
57117-31-4	123678-PeCDF	Diox/F	SW846 8280	0.2	ng/l	0.02	ng/g
1-20-0	Total HeCDD	Diox/F	SW846 8280	0.2	ng/l	0.02	ng/g
39227-28-6	123478-HeCDD	Diox/F	SW846 8280	0.4	ng/l	0.04	ng/g
57653-85-7	123678-HeCDD	Diox/F	SW846 8280	0.4	ng/l	0.04	ng/g
19408-74-3	123789-HeCDD	Diox/F	SW846 8280	0.2	ng/l	0.02	ng/g
1-20-1	Total HeCDF	Diox/F	SW846 8280	0.2	ng/l	0.02	ng/g
70648-26-9	123478-HeCDF	Diox/F	SW846 8280	0.4	ng/l	0.04	ng/g
57117-44-9	123678-HeCDF	Diox/F	SW846 8280	0.4	ng/l	0.04	ng/g
72918-21-9	123789-HeCDF	Diox/F	SW846 8280	0.2	ng/l	0.02	ng/g
60851-34-5	234678-HeCDF	Diox/F	SW846 8280	0.2	ng/l	0.02	ng/g
1-01-9	Total HpCDD	Diox/F	SW846 8280	0.2	ng/l	0.02	ng/g
35822-46-9	1234678-HpCDD	Diox/F	SW846 8280	0.2	ng/l	0.02	ng/g
1-02-0	Total HpCDF	Diox/F	SW846 8280	0.2	ng/l	0.02	ng/g
67562-39-4	1234678-HpCDF	Diox/F	SW846 8280	0.2	ng/l	0.02	ng/g
55673-89-7	11234789-HpCDF	Diox/F	SW846 8280	0.2	ng/l	0.02	ng/g
3268-87-9	OCDD	Diox/F	SW846 8280	0.4	ng/l	0.04	ng/g
39001-02-0	OCDF	Diox/F	SW846 8280	0.4	ng/l	0.04	ng/g
7440-36-0	Antimony	M	SW846-6010A	60	ug/l	12	mg/kg
7440-38-2	Arsenic	M	SW846-6010A/7000A	10	ug/l	1.5	mg/kg
7440-39-3	Barium	M	SW846-6010A	200	ug/l	15	mg/kg
7440-41-7	Beryllium	M	SW846-6010A	5	ug/l	0.15	mg/kg
7440-43-9	Cadmium	M	SW846-6010A	5	ug/l	0.15	mg/kg
7440-47-3	Chromium	M	SW846-6010A	10	ug/l	0.5	mg/kg
7440-48-4	Cobalt	M	SW846-6010A	50	ug/l	8	mg/kg
7440-50-8	Copper	M	SW846-6010A	25	ug/l	6	mg/kg
7439-92-1	Lead	M	SW846-6010A/7000A	3	ug/l	0.8	mg/kg
7439-97-6	Mercury	M	SW846-7470A/7471A	0.2	ug/l	0.15	mg/kg
7440-02-0	Nickel	M	SW846-6010A	40	ug/l	0.9	mg/kg
7782-49-2	Selenium	M	SW846-6010A/7000A	5	ug/l	0.8	mg/kg
7440-22-4	Silver	M	SW846-6010A	10	ug/l	3	mg/kg
7440-28-0	Thallium	M	SW846-6010A/7000A	10	ug/l	3	mg/kg

Table 6-1
PRACTICAL QUANTITATION LIMITS FOR CONSTITUENTS FOR WHICH ANALYSIS MAY BE CONDUCTED

CAS#	Analyte Name	Fraction	Project Quantitation Limits				
			Method	Aqueous	Units	Soil	Units
7440-31-5	Tin	M	SW846-6010A	250	ug/l	20	mg/kg
7440-62-2	Vanadium	M	SW846-6010A	50	ug/l	3	mg/kg
7440-66-6	Zinc	M	SW846-6010A	20	ug/l	15	mg/kg
7429-90-5	Aluminum	M	SW846-6010A	200	ug/l	46	mg/kg
7440-70-2	Calcium	M	SW846-6010A	5000	ug/l	76	mg/kg
7439-89-6	Iron	M	SW846-6010A	100	ug/l	30	mg/kg
7439-95-4	Magnesium	M	SW846-6010A	5000	ug/l	38	mg/kg
7439-96-5	Manganese	M	SW846-6010A	15	ug/l	3	mg/kg
7440-09-7	Potassium	M	SW846-6010A	5000	ug/l	76	mg/kg
7440-23-5	Sodium	M	SW846-6010A	5000	ug/l	76	mg/kg
SA0001	Alkalinity (to pH 8.3)	WC	EPA 310.1	1	mg/l	5	mg/kg
SA0002	Total Alkalinity (to pH 4.5)	WC	EPA 310.1	1	mg/l	5	mg/kg
SA0003	Ammonia	WC	EPA 350.2	1	mg/l	20	mg/kg
SA0004	BOD	WC	EPA 405.1	2	mg/l	200	mg/kg
SA0006	Chloride	WC	EPA 300.0	0.2	mg/l	2	mg/kg
SA0007	COD	WC	EPA 410.2	7	mg/l	1250	mg/kg
SA0008	Cyanide, Total	WC	SW846 9012A	0.005	mg/l	0.1	mg/kg
SA0011	Hexavalent Chromium	WC	SW846 7196A	0.01	mg/l	4	mg/kg
SA0012	Nitrate/Nitrite	WC	EPA 300.0	0.1/0.1	mg/l	1.0/1.0	mg/kg
SA0014	Orthophosphate	WC	EPA 365.3	0.01	mg/l	1	mg/kg
SA0018	Total Dissolved Solids	WC	EPA 160.1	30	mg/l	NA	mg/kg
SA0019	Total Organic Carbon	WC	EPA 415.1/Kahn	1	mg/l	5	mg/kg
SA0023	Total Sulfate	WC	EPA 300.0	0.5	mg/l	5	mg/kg
SA0024	Total Suspended Solids	WC	EPA 160.2	9	mg/l	NA	mg/kg

NOTES:

(1) Fractions: VOA (Volatile Organic, DAI (Direct Aqueous Injection), SV (Semivolatile Organic), OCP (Organochlorine Pesticide), OP (Organophospohorus Pesticide, H (Herbicide), Diox/F (Dioxin/Furan), M (Metal), WC (Wet Chemistry Parameter) and RAD (Radiological)

(2) Fictitious CAS number created to represent the coeluting isomers 3-methylphenol and 4-methylphenol. – where is it?

TBD - PQL to be determined.

SW-846 - "Test Methods for Evaluating Solid Waste, Physical Chemical Methods," third edition.

EPA - "Methods for Chemical Analysis of Water and Wastes," EPA 600 4/79-020

Table 6-2
ACCURACY AND PRECISION DATA QUALITY OBJECTIVES

Parameter	Audit	Compounds	Aqueous Control Limits	Solid Control Limits
TCL Volatile Compounds	Lab blank, trip blank, or field blank	All TCL Compounds	<5X the QL for methylene chloride, and <QL for all other compounds	<5X the QL for methylene chloride, and <QL for all other compounds
	Matrix Spike Duplicate Precision	All TCL Compounds	Table 6-3	Table 6-3
	Matrix Spike Recovery	All TCL Compounds	Table 6-3	Table 6-3
	Laboratory Control Sample Recovery	All TCL Compounds	Table 6-3	Table 6-3
	Surrogate Spike Recoveries	4-Bromoflurobenzene 1,2-Dichloroethane-d4 Toluene-d8	86-115% 76-114% 88-110%	74-121% 70-121% 81-117%
TCL Semivolatile Compounds	Lab blank, trip blank, or field blank	All TCL Compounds	<5X the QL for methylene chloride, and <QL for all other compounds	<5X the QL for methylene chloride, and <QL for all other compounds
	Matrix Spike Duplicate Precision	All TCL Compounds	Table 6-3	Table 6-3
	Matrix Spike Recovery	All TCL Compounds	Table 6-3	Table 6-3
	Laboratory Control Sample Recovery	All TCL Compounds	Table 6-3	Table 6-3
	Surrogate Spike Recoveries	Nitrobenzene-d5 2-Fluorobiphenyl p-Terphenyl-d14 Phenol-d6 2-Fluorophenol 2,4,6-Tribromophenol 4,4-Dibromobipheyl (Spiked onto cartidge before it is sent to the field)	35-114% 43-116% 33-141% 10-94% 21-100% 10-123% NA	23-120% 30-115% 18-137% 24-113% 25-121% 19-122% NA

Table 6-2
ACCURACY AND PRECISION DATA QUALITY OBJECTIVES

Parameter	Audit	Compounds	Aqueous Control Limits	Solid Control Limits
TCL Pesticides/PCBs Compounds	Lab blank, trip blank, or field blank	All TCL Compounds	<QL for all compounds	<QL for all compounds
	Matrix Spike Duplicate Precision	All TCL Compounds	Table 6-3	Table 6-3
	Matrix Spike Recovery	All TCL Compounds	Table 6-3	Table 6-3
	Laboratory Control Sample Recovery	All TCL Compounds	Table 6-3	Table 6-3
	Surrogate Spike Recoveries	tetra-chloro-meta-xylene decachlorobiphenyl	60-150% 60-150%	60-150% 60-150%
TAL Metals plus Tin	Lab blank, trip blank, or field blank	All Metals	<PRDL for all metals	<PRDL for all metals
	Laboratory Duplicate Precision	All Metals	Table 6-3	Table 6-3
	Matrix Spike Recovery	All Metals	Table 6-3	Table 6-3
	Laboratory Control Sample Recovery	All Metals	Table 6-3	Table 6-3
All Wet Chemistry Parameters	Lab blank, trip blank, or field blank	All Parameters	<QL for all parameters	<QL for all parameters
	Laboratory Duplicate Precision	All Parameters	Table 6-3	Table 6-3
	Matrix Spike Recovery	All Parameters	Table 6-3	Table 6-3
	Laboratory Control Sample Recovery	All Parameters	Table 6-3	Table 6-3

Table 6-2
ACCURACY AND PRECISION DATA QUALITY OBJECTIVES

Parameter	Audit	Compounds	Aqueous Control Limits	Solid Control Limits
Dioxins/Dibenzofurans	Lab blank, trip blank, or field blank	All Compounds	<10X any associated sample result for OCDD, <5X any associated sample result for all other compounds	<10X any associated sample result for OCDD, <5X any associated sample result for all other compounds
	Matrix Spike Duplicate Precision	All Compounds	Table 6-3	Table 6-3
	Matrix Spike Recovery	All Compounds	Table 6-3	Table 6-3
	Laboratory Control Sample Recovery	All Compounds	Table 6-3	Table 6-3
	Recovery Standard Recovery	C13-1,2,3,4-TCDD	>40%	>40%

NOTE: QL: Quantitation Limit. PRDL = Project Required Detection Limit. TCL = Target Compound List. NA = Not applicable

Table 6-3
MATRIX SPIKE AND LABORATORY CONTROL SAMPLE
PRECISION AND ACCURACY OBJECTIVES

CAS#	Analyte Name	Fraction	Method	AQUEOUS			SOLID/SOIL		
				MS/MSD % Recovery	MS/MSD or LD % RPD	LCS% Recovery	MS/MSD % Recovery	MS/MSD or LD % RPD	LCS% Recovery
67-64-1	Acetone	VOA	SW846-8240A	36-132	15	36-132	33-138	40	33-138
71-43-2	Benzene	VOA	SW846-8240A	50-150	15	50-150	42-167	40	42-167
75-27-4	Bromodichloromethane	VOA	SW846-8240A	19-146	15	19-146	45-453	40	45-453
75-25-2	Bromoform	VOA	SW846-8240A	29-141	15	29-141	42-145	40	42-145
74-83-9	Methyl bromide	VOA	SW846-8240A	13-174	15	13-174	34-164	40	34-164
78-93-3	Methyl ethyl ketone	VOA	SW846-8240A	35-153	15	35-153	46-146	40	46-146
75-15-0	Carbon disulfide	VOA	SW846-8240A	14-171	15	14-171	39-153	40	39-153
56-23-5	Carbon tetrachloride	VOA	SW846-8240A	52-151	15	52-151	42-168	40	42-168
108-90-7	Chlorobenzene	VOA	SW846-8240A	54-149	15	54-149	43-164	40	43-164
75-00-3	Chloroethane	VOA	SW846-8240A	16-167	15	16-167	31-160	40	31-160
67-66-3	Chloroform	VOA	SW846-8240A	56-152	15	56-152	46-160	40	46-160
74-87-3	Methyl chloride	VOA	SW846-8240A	30-170	15	30-170	25-175	40	25-175
124-48-1	Chlorodibromomethane	VOA	SW846-8240A	33-150	15	33-150	44-151	40	44-151
75-34-3	1,1-Dichloroethane	VOA	SW846-8240A	36-166	15	36-166	44-164	40	44-164
107-06-2	1,2-Dichloroethane	VOA	SW846-8240A	52-149	15	52-149	46-160	40	46-160
75-35-4	1,1-Dichloroethane	VOA	SW846-8240A	22-181	15	22-181	52-166	40	52-166
540-59-0	1,2-Dichloroethane (total)	VOA	SW846-8240A	53-149	15	53-149	43-167	40	43-167
78-87-5	1,2-Dichloropropane	VOA	SW846-8240A	36-164	15	36-164	46-163	40	46-163
10061-01-5	cis-1,3-Dichloropropene	VOA	SW846-8240A	47-140	15	47-140	45-153	40	45-153
10061-02-6	trans-1,3-Dichloropropene	VOA	SW846-8240A	27-143	15	27-143	35-19	40	35-19
100-41-4	Ethylbenzene	VOA	SW846-8240A	54-157	15	54-157	45-172	40	45-172
591-78-6	Methyl butyl ketone	VOA	SW846-8240A	34-141	15	34-141	55-134	40	55-134
75-09-2	Methylene chloride	VOA	SW846-8240A	52-156	15	52-156	41-181	40	41-181
108-10-1	Methyl isobutyl ketone	VOA	SW846-8240A	45-119	15	45-119	54-128	40	54-128
100-42-5	Styrene	VOA	SW846-8240A	44-153	15	44-153	76-132	40	76-132
79-34-5	1,1,2,2-Tetrachloroethane	VOA	SW846-8240A	40-139	15	40-139	43-148	40	43-148
127-18-4	Tetrachloroethene	VOA	SW846-8240A	51-165	15	51-165	43-183	40	43-183
108-88-3	Toluene	VOA	SW846-8240A	49-156	15	49-156	44-170	40	44-170
71-55-6	1,1,1-Trichloroethane	VOA	SW846-8240A	1-144	15	1-144	45-166	40	45-166
79-00-5	1,1,2-Trichloroethane	VOA	SW846-8240A	48-142	15	48-142	44-156	40	44-156
79-01-6	Trichloroethene	VOA	SW846-8240A	36-159	15	36-159	42-169	40	42-169
75-01-4	Vinyl chloride	VOA	SW846-8240A	38-168	15	38-168	31-176	40	31-176
1330-20-7	Xylenes (total)	VOA	SW846-8240A	52-150	15	52-150	42-162	40	42-162
95-50-1	1,2-Dichlorobenzene	VOA	TO-14	NA	NA	NA	NA	NA	NA
541-73-1	1,3-Dichlorobenzene	VOA	TO-14	NA	NA	NA	NA	NA	NA

Table 6-3
MATRIX SPIKE AND LABORATORY CONTROL SAMPLE
PRECISION AND ACCURACY OBJECTIVES

				AQUEOUS			SOLID/SOIL		
CAS#	Analyte Name	Fraction	Method	MS/MSD % Recovery	MS/MSD or LD % RPD	LCS% Recovery	MS/MSD % Recovery	MS/MSD or LD % RPD	LCS% Recovery
106-46-7	1,4-Dichlorobenzene	VOA	TO-14	NA	NA	NA	NA	NA	NA
67-64-1	Acetone	VOA	SW846-8010B/8020A	NA	NA	NA	70-130	40	70-130
71-43-2	Benzene	VOA	SW846-8010B/8020A	NA	NA	NA	87-122	40	87-122
75-27-4	Bromodichloromethane	VOA	SW846-8010B/8020A	NA	NA	NA	82-121	40	82-121
75-25-2	Bromoform	VOA	SW846-8010B/8020A	NA	NA	NA	80-144	40	80-144
74-83-9	Methyl bromide	VOA	SW846-8010B/8020A	NA	NA	NA	69-117	40	69-117
78-93-3	Methyl ethyl ketone	VOA	SW846-8010B/8020A	NA	NA	NA	70-130	40	70-130
56-23-5	Carbon tetrachloride	VOA	SW846-8010B/8020A	NA	NA	NA	88-121	40	88-121
108-90-7	Chlorobenzene	VOA	SW846-8010B/8020A	NA	NA	NA	36-140	40	36-140
75-00-3	Chloroethane	VOA	SW846-8010B/8020A	NA	NA	NA	68-114	40	68-114
67-66-3	Chloroform	VOA	SW846-8010B/8020A	NA	NA	NA	81-120	40	81-120
74-87-3	Methyl chloride	VOA	SW846-8010B/8020A	NA	NA	NA	52-112	40	52-112
124-48-1	Chlorodibromomethane	VOA	SW846-8010B/8020A	NA	NA	NA	80-128	40	80-128
75-34-3	1,1-Dichloroethane	VOA	SW846-8010B/8020A	NA	NA	NA	75-125	40	75-125
107-06-2	1,2-Dichloroethane	VOA	SW846-8010B/8020A	NA	NA	NA	80-117	40	80-117
75-35-4	1,1-Dichloroethane	VOA	SW846-8010B/8020A	NA	NA	NA	83-128	40	83-128
540-59-0	1,2-Dichloroethane (total)	VOA	SW846-8010B/8020A	NA	NA	NA	81-122	40	81-122
78-87-5	1,2-Dichloropropane	VOA	SW846-8010B/8020A	NA	NA	NA	87-118	40	87-118
10061-01-5	cis-1,3-Dichloropropene	VOA	SW846-8010B/8020A	NA	NA	NA	82-119	40	82-119
10061-02-6	trans-1,3-Dichloropropene	VOA	SW846-8010B/8020A	NA	NA	NA	82-120	40	82-120
100-41-4	Ethylbenzene	VOA	SW846-8010B/8020A	NA	NA	NA	90-122	40	90-122
75-09-2	Methylene chloride	VOA	SW846-8010B/8020A	NA	NA	NA	76-118	40	76-118
100-42-5	Styrene	VOA	SW846-8010B/8020A	NA	NA	NA	90-110	40	90-110
79-34-5	1,1,2,2-Tetrachloroethane	VOA	SW846-8010B/8020A	NA	NA	NA	75-125	40	75-125
127-18-4	Tetrachloroethene	VOA	SW846-8010B/8020A	NA	NA	NA	87-122	40	87-122
108-88-3	Toluene	VOA	SW846-8010B/8020A	NA	NA	NA	93-117	40	93-117
71-55-6	1,1,1-Trichloroethane	VOA	SW846-8010B/8020A	NA	NA	NA	86-122	40	86-122
79-00-5	1,1,2-Trichloroethane	VOA	SW846-8010B/8020A	NA	NA	NA	76-114	40	76-114
79-01-6	Trichloroethene	VOA	SW846-8010B/8020A	NA	NA	NA	85-121	40	85-121
75-01-4	Vinyl chloride	VOA	SW846-8010B/8020A	NA	NA	NA	61-168	40	61-168
1330-20-7	Xylenes (total)	VOA	SW846-8010B/8020A	NA	NA	NA	90-119	40	90-119
83-32-9	Acenaphthene	SV	SW846-8270A	58.39-107.83	20	58.39-107.83	45.73-117.01	40	45.73-117.01
208-96-8	Acenaphthylene	SV	SW846-8270A	50.14-111.64	20	50.14-111.64	42.67-116.41	40	42.67-116.41

Table 6-3
MATRIX SPIKE AND LABORATORY CONTROL SAMPLE
PRECISION AND ACCURACY OBJECTIVES

CAS#	Analyte Name	Fraction	Method	AQUEOUS			SOLID/SOIL		
				MS/MSD % Recovery	MS/MSD or LD % RPD	LCS% Recovery	MS/MSD % Recovery	MS/MSD or LD % RPD	LCS% Recovery
120-12-7	Anthracene	SV	SW846-8270A	59.13-104.31	20	59.13-104.31	41.19-120.63	40	41.19-120.63
56-55-3	Benzo[a]anthracene	SV	SW846-8270A	60.62-111.02	20	60.62-111.02	47.96-123.56	40	47.96-123.56
205-99-2	Benzo[b]fluoranthene	SV	SW846-8270A	55.22-114.20	20	55.22-114.20	39.96-133.92	40	39.96-133.92
207-08-9	Benzo[k]fluoranthene	SV	SW846-8270A	49.90-125.86	20	49.90-125.86	41.33-134.27	40	41.33-134.27
191-24-2	Benzo[ghi]perylene	SV	SW846-8270A	47.16-137.46	20	47.16-137.46	35.21-146.69	40	35.21-146.69
50-32-8	Benzo[a]pyrene	SV	SW846-8270A	47.80-122.74	20	47.80-122.74	42.29-137.51	40	42.29-137.51
111-91-1	bis(2-Chloroethoxy) methane	SV	SW846-8270A	47.27-109.25	20	47.27-109.25	40.76-116.66	40	40.76-116.66
111-44-4	bis(2-Chloroethyl)ether	SV	SW846-8270A	53.102.32	20	53.102.32	39.38-116.18	40	39.38-116.18
108-60-1	bis(2-Chloroisopropyl)ether	SV	SW846-8270A	42.17-117.29	20	42.17-117.29	65.39-108.29	40	65.39-108.29
117-81-7	bis(2-Ethylhexyl)phthalate	SV	SW846-8270A	54.78-121.56	20	54.78-121.56	45.00-131.76	40	45.00-131.76
101-55-3	4-Bromophenyl phenyl ether	SV	SW846-8270A	60.34-105.70	20	60.34-105.70	45.59-122.81	40	45.59-122.81
85-68-7	Butyl benzyl phthalate	SV	SW846-8270A	49.45-118.99	20	49.45-118.99	47.86-134.62	40	47.86-134.62
106-47-8	4-Chloroaniline	SV	SW846-8270A	49.33-99.43	20	49.33-99.43	D.L.-123.34	40	D.L.-123.34
59-50-7	4-Chloro-3-methylphenol	SV	SW846-8270A	57.92-111.02	20	57.92-111.02	48.26-117.20	40	48.26-117.20
91-58-7	2-Chlronaphthalene	SV	SW846-8270A	54.92-105.08	20	54.92-105.08	45.47-117.23	40	45.47-117.23
95-57-8	2-Chlorophenol	SV	SW846-8270A	55.79-100.73	20	55.79-100.73	42.49-114.43	40	42.49-114.43
7005-72-3	4-Chlorophenyl phenyl ether	SV	SW846-8270A	54.35-107.75	20	54.35-107.75	48.77-116.81	40	48.77-116.81
218-01-9	Chrysene	SV	SW846-8270A	58.36-114.52	20	58.36-114.52	47.92-126.04	40	47.92-126.04
132-64-9	Dibenzofuran	SV	SW846-8270A	54.76-113.08	20	54.76-113.08	67.35-102.93	40	67.35-102.93
84-74-2	Di-n-butyl phthalate	SV	SW846-8270A	54.11-114.77	20	54.11-114.77	42.68-125.66	40	42.68-125.66
53-70-3	Dibenz[a,h]anthracene	SV	SW846-8270A	49.70-145.52	20	49.70-145.52	44.99-154.13	40	44.99-154.13
95-50-1	1,2-Dichlorobenzene	SV	SW846-8270A	47.02-97.78	20	47.02-97.78	38.75-112.33	40	38.75-112.33
541-73-1	1,3-Dichlorobenzene	SV	SW846-8270A	42.68-94.40	20	42.68-94.40	37.33-112.33	40	37.33-112.33
106-46-7	1,4-Dichlorobenzene	SV	SW846-8270A	42.63-94.40	20	42.63-94.40	38.76-110.40	40	38.76-110.40
91-94-1	3,3-Dichlorobenzidine	SV	SW846-8270A	51.64-112.24	20	51.64-112.24	18.95-116.93	40	18.95-116.93
120-83-2	2,4-Dichlorophenol	SV	SW846-8270A	55.97-105.05	20	55.97-105.05	45.61-116.89	40	45.61-116.89
84-66-2	Diethyl phthalate	SV	SW846-8270A	47.59-114.55	20	47.59-114.55	49.02-126.90	40	49.02-126.90
105-67-9	2,4-Dimethylphenol	SV	SW846-8270A	51.83-94.37	20	51.83-94.37	32.55-112.71	40	32.55-112.71
131-11-3	Dimethyl phthalate	SV	SW846-8270A	25.46-106.28	20	25.46-106.28	48.92-123.26	40	48.92-123.26
534-52-1	4,6-Dinitro-2-methylphenol	SV	SW846-8270A	52.71-117.15	20	52.71-117.15	27.89-147.11	40	27.89-147.11
51-28-5	2,4-Dinitrophenol	SV	SW846-8270A	42.60-130.86	20	42.60-130.86	9.14-166.64	40	9.14-166.64
121-14-2	2,4-Dinitrotoluene	SV	SW846-8270A	55.68-117.66	20	55.68-117.66	48.40-126.46	40	48.40-126.46
606-20-2	2,6-Dinitrotoluene	SV	SW846-8270A	55.84-106.48	20	55.84-106.48	46.52-121.70	40	46.52-121.70
117-84-0	Di-n-octyl phthalate	SV	SW846-8270A	44.18-139.70	20	44.18-139.70	34.97-149.65	40	34.97-149.65
206-44-0	Fluoranthene	SV	SW846-8270A	53.22-114.72	20	53.22-114.72	44.46-121.20	40	44.46-121.20

Table 6-3
MATRIX SPIKE AND LABORATORY CONTROL SAMPLE
PRECISION AND ACCURACY OBJECTIVES

				AQUEOUS			SOLID/SOIL		
CAS#	Analyte Name	Fraction	Method	MS/MSD % Recovery	MS/MSD or LD % RPD	LCS% Recovery	MS/MSD % Recovery	MS/MSD or LD % RPD	LCS% Recovery
86-73-7	Fluorene	SV	SW846-8270A	50.51-113.15	20	50.51-113.15	46.12-114.46	40	46.12-114.46
118-74-1	Hexachlorobenzene	SV	SW846-8270A	62.54-107.66	20	62.54-107.66	44.07-126.09	40	44.07-126.09
87-68-3	Hexachlorobutadiene	SV	SW846-8270A	29.68-84.88	20	29.68-84.88	41.27-117.23	40	41.27-117.23
77-47-4	Hexachlorocyclopentadiene	SV	SW846-8270A	D.L.-131.66	20	D.L.-131.66	D.L.-124.98	40	D.L.-124.98
67-72-1	Hexachloroethane	SV	SW846-8270A	34.65-82.53	20	34.65-82.53	38.86-110.44	40	38.86-110.44
193-39-5	Indeno(1,2,3-cd)pyrene	SV	SW846-8270A	48.29-141.29	20	48.29-141.29	44.43-150.75	40	44.43-150.75
78-59-1	Isophorone	SV	SW846-8270A	54.27-105.57	20	54.27-105.57	40.63-114.85	40	40.63-114.85
91-57-6	2-Methylnaphthalene	SV	SW846-8270A	48.84-103.80	20	48.84-103.80	61.07-98.99	40	61.07-98.99
95-48-7	2-Methylphenol	SV	SW846-8270A	46.89-87.27	20	46.89-87.27	58.39-114.37	40	58.39-114.37
91-20-3	Naphthalene	SV	SW846-8270A	49.92-108.42	20	49.92-108.42	41.40-115.26	40	41.40-115.26
88-74-4	2-Nitroaniline	SV	SW846-8270A	58.80-112.02	20	58.80-112.02	74.00-102.38	40	74.00-102.38
99-09-2	3-Nitroaniline	SV	SW846-8270A	50.46-113.88	20	50.46-113.88	47.25-105.03	40	47.25-105.03
100-01-6	4-Nitroaniline	SV	SW846-8270A	53.97-125.73	20	53.97-125.73	36.90-107.64	40	36.90-107.64
98-95-3	Nitrobenzene	SV	SW846-8270A	54.14-106.10	20	54.14-106.10	42.61-116.17	40	42.61-116.17
88-75-5	2-Nitrophenol	SV	SW846-8270A	65.48-111.74	20	65.48-111.74	43.95-122.19	40	43.95-122.19
100-02-7	4-Nitrophenol	SV	SW846-8270A	16.88-67.70	20	16.88-67.70	42.30-145.62	40	42.30-145.62
86-30-6	N-Nitrosodiphenylamine	SV	SW846-8270A	32.68-69.58	20	32.68-69.58	39.02-124.78	40	39.02-124.78
621-64-7	N-Nitrosodipropylamine	SV	SW846-8270A	50.73-112.47	20	50.73-112.47	40.40-119.78	40	40.40-119.78
87-86-5	Pentachlorophenol	SV	SW846-8270A	29.27-134.93	20	29.27-134.93	18.06-160.62	40	18.06-160.62
85-01-8	Phenanthrene	SV	SW846-8270A	59.89-108.49	20	59.89-108.49	43.36-121.12	40	43.36-121.12
108-95-2	Phenol	SV	SW846-8270A	28.09-58.09	20	28.09-58.09	36.01-121.09	40	36.01-121.09
129-00-0	Pyrene	SV	SW846-8270A	58.27-118.03	20	58.27-118.03	44.59-130.03	40	44.59-130.03
120-82-1	1,2,4-Trichlorobenzene	SV	SW846-8270A	44.87-100.25	20	44.87-100.25	41.81-114.23	40	41.81-114.23
95-95-4	2,4,5-Trichlorophenol	SV	SW846-8270A	61.65-118.29	20	61.65-118.29	68.75-114.59	40	68.75-114.59
88-06-2	2,4,6-Trichlorophenol	SV	SW846-8270A	50.28-108.54	20	50.28-108.54	45.83-118.31	40	45.83-118.31
86-74-8	Carbazole	SV	SW846-8270A	39.6-136.8	20	39.6-136.8	35.3-133.1	40	35.3-133.1
309-00-2	Aldrin	OCP	SW846-8080A	59-120	20	59-120	62-120	40	62-120
319-84-6	alpha-BHC	OCP	SW846-8080A	69-120	20	69-120	59-120	40	59-120
319-85-7	beta-BHC	OCP	SW846-8080A	72-115	20	72-115	72-115	40	72-115
319-86-8	delta-BHC	OCP	SW846-8080A	62-120	20	62-120	68-110	40	68-110
58-89-9	gamma-BHC/Lindane	OCP	SW846-8080A	79.12	20	79.12	63-120	40	63-120
72-54-8	4,4-DDD	OCP	SW846-8080A	71.115	20	71.115	65-120	40	65-120
72-55-9	4,4-DDE	OCP	SW846-8080A	69-105	20	69-105	63-120	40	63-120
50-29-3	4,4-DDt	OCP	SW846-8080A	74-120	20	74-120	59-121	40	59-121

Table 6-3
MATRIX SPIKE AND LABORATORY CONTROL SAMPLE
PRECISION AND ACCURACY OBJECTIVES

				AQUEOUS			SOLID/SOIL		
CAS#	Analyte Name	Fraction	Method	MS/MSD % Recovery	MS/MSD or LD % RPD	LCS% Recovery	MS/MSD % Recovery	MS/MSD or LD % RPD	LCS% Recovery
60-57-1	Dieldrin	OCP	SW846-8080A	77-120	20	77-120	55-123	40	55-123
959-98-8	Endosulfan I	OCP	SW846-8080A	72-110	20	72-110	57-120	40	57-120
33213-65-9	Endosulfan II	OCP	SW846-8080A	76-120	20	76-120	64-120	40	64-120
1031-07-8	Endosulfan sulfate	OCP	SW846-8080A	63-120	20	63-120	62-120	40	62-120
72-20-8	Endrin	OCP	SW846-8080A	73-120	20	73-120	64-124	40	64-124
7421-93-4	Endrin aldehyde	OCP	SW846-8080A	70-121	20	70-121	31-120	40	31-120
76-44-8	Heptachlor	OCP	SW846-8080A	64-120	20	64-120	45-120	40	45-120
1024-57-3	Heptachlor epoxide	OCP	SW846-8080A	80-20	20	80-20	71-126	40	71-126
72-43-5	Methoxychlor	OCP	SW846-8080A	76-120	20	76-120	39-129	40	39-129
8001-35-2	Toxaphene	OCP	SW846-8080A	NA	NA	NA	NA	NA	NA
12674-11-2	Aroclor-1016	OCP	SW846-8080A	NA	NA	NA	NA	NA	NA
11104-28-2	Aroclor-1221	OCP	SW846-8080A	NA	NA	NA	NA	NA	NA
11141-16-5	Aroclor-1232	OCP	SW846-8080A	NA	NA	NA	NA	NA	NA
53469-21-9	Aroclor-1242	OCP	SW846-8080A	75-120	20	75-120	69-115	40	69-115
12672-29-6	Aroclor-1248	OCP	SW846-8080A	NA	NA	NA	NA	NA	NA
11097-69-1	Aroclor-1254	OCP	SW846-8080A	NA	NA	NA	NA	NA	NA
11096-82-5	Aroclor-1260	OCP	SW846-8080A	77-120	20	77-120	71-119	40	71-119
5103-71-9	alpha-Chlordane	OCP	SW846-8080A	60-140	20	60-140	60-140	40	60-140
5103-74-2	gamma-Chlordane	OCP	SW846-8080A	60-140	20	60-140	60-140	40	60-140
53494-70-5	Endrin ketone	OCP	SW846-8080A	60-140	20	60-140	60-140	40	60-140
1-33-1	Total-TCDD	Diox/F	SW846 8280	NA	NA	NA	NA	NA	NA
1746-01-6	2378-TCDD	Diox/F	SW846 8280	60-140	50	57-128	60-140	50	55-136
1-33-2	Total-TCDF	Diox/F	SW846 8280	NA	NA	NA	NA	NA	NA
51207-31-9	2378-TCDF	Diox/F	SW846 8280	60-140	50	62-129	60-140	50	72-118
1-28-9	Total PeCDD	Diox/F	SW846 8280	NA	NA	NA	NA	NA	NA
40321-76-4	12378-PeCDD	Diox/F	SW846 8280	60-140	50	80-125	60-140	50	67-139
1-29-0	Total PeCDF	Diox/F	SW846 8280	NA	NA	NA	NA	NA	NA
57117-41-6	123478-PeCDF	Diox/F	SW846 8280	NA	NA	NA	NA	NA	NA
57117-31-4	123678-PeCDF	Diox/F	SW846 8280	60-140	50	51-132	60-140	50	54-129
1-20-0	Total HeCDF	Diox/F	SW846 8280	NA	NA	NA	NA	NA	NA
39227-28-6	123478-HeCDD	Diox/F	SW846 8280	60-140	50	64-127	60-140	50	57-132
57653-85-7	123678-HeCDD	Diox/F	SW846 8280	NA	NA	NA	NA	NA	NA
19408-74-3	123789-HeCDD	Diox/F	SW846 8280	NA	NA	NA	NA	NA	NA
1-20-1	Total HeCDF	Diox/F	SW846 8280	NA	NA	NA	NA	NA	NA

Table 6-3
MATRIX SPIKE AND LABORATORY CONTROL SAMPLE
PRECISION AND ACCURACY OBJECTIVES

CAS#	Analyte Name	Fraction	Method	AQUEOUS MS/MSD % Recovery	AQUEOUS MS/MSD or LD % RPD	AQUEOUS LCS% Recovery	SOLID/SOIL MS/MSD % Recovery	SOLID/SOIL MS/MSD or LD % RPD	SOLID/SOIL LCS% Recovery
70648-26-9	123478-HeCDF	Diox/F	SW846 8280	60-140	50	50-146	60-140	50	50-150
57117-44-9	123678-HeCDF	Diox/F	SW846 8280	NA	NA	NA	NA	NA	NA
72918-21-9	123789-HeCDF	Diox/F	SW846 8280	NA	NA	NA	NA	NA	NA
60851-34-5	234678-HeCDF	Diox/F	SW846 8280	NA	NA	NA	NA	NA	NA
1-01-9	Total HpCDD	Diox/F	SW846 8280	NA	NA	NA	NA	NA	NA
35822-46-9	1234678-HpCDD	Diox/F	SW846 8280	60-140	50	60-131	60-140	50	50-138
1-02-0	Total HpCDF	Diox/F	SW846 8280	NA	NA	NA	NA	NA	NA
67562-39-4	1234678-HpCDF	Diox/F	SW846 8280	60-140	50	50-150	60-140	50	50-150
55673-89-7	11234789-HpCDF	Diox/F	SW846 8280	NA	NA	NA	NA	NA	NA
3268-87-9	OCDD	Diox/F	SW846 8280	60-140	50	50-147	60-140	50	50-149
39001-02-0	OCDF	Diox/F	SW846 8280	60-140	50	50-150	60-140	50	50-150
7440-36-0	Antimony	M	SW846-6010A	75-125	20	75-125	75-125	20	75-125
7440-38-2	Arsenic	M	SW846-6010A/7000A	75-125	20	75-125	75-125	20	75-125
7440-39-3	Barium	M	SW846-6010A	75-125	20	75-125	75-125	20	75-125
7440-41-7	Beryllium	M	SW846-6010A	75-125	20	75-125	75-125	20	75-125
7440-43-9	Cadmium	M	SW846-6010A	75-125	20	75-125	75-125	20	75-125
7440-47-3	Chromium	M	SW846-6010A	75-125	20	75-125	75-125	20	75-125
7440-48-4	Cobalt	M	SW846-6010A	75-125	20	75-125	75-125	20	75-125
7440-50-8	Copper	M	SW846-6010A	75-125	20	75-125	75-125	20	75-125
7439-92-1	Lead	M	SW846-6010A/7000A	75-125	20	75-125	75-125	20	75-125
7439-97-6	Mercury	M	SW846-7470A/7471A	75-125	20	75-125	75-125	20	75-125
7440-02-0	Nickel	M	SW846-6010A	75-125	20	75-125	75-125	20	75-125
7782-49-2	Selenium	M	SW846-6010A/7000A	75-125	20	75-125	75-125	20	75-125
7440-22-4	Silver	M	SW846-6010A	75-125	20	75-125	75-125	20	75-125
7440-28-0	Thallium	M	SW846-6010A/7000A	75-125	20	75-125	75-125	20	75-125
7440-62-2	Vanadium	M	SW846-6010A	75-125	20	75-125	75-125	20	75-125
7440-66-6	Zinc	M	SW846-6010A	75-125	20	75-125	75-125	20	75-125
7429-90-5	Aluminum	M	SW846-6010A	75-125	20	75-125	75-125	20	75-125
7440-70-2	Calcium	M	SW846-6010A	75-125	20	75-125	75-125	20	75-125
7439-89-6	Iron	M	SW846-6010A	75-125	20	75-125	75-125	20	75-125
7439-95-4	Magnesium	M	SW846-6010A	75-125	20	75-125	75-125	20	75-125
7439-96-5	Manganese	M	SW846-6010A	75-125	20	75-125	75-125	20	75-125
7440-09-7	Potassium	M	SW846-6010A	75-125	20	75-125	75-125	20	75-125
7440-23-5	Sodium	M	SW846-6010A	75-125	20	75-125	75-125	20	75-125

Table 6-3
MATRIX SPIKE AND LABORATORY CONTROL SAMPLE
PRECISION AND ACCURACY OBJECTIVES

				AQUEOUS			SOLID/SOIL		
CAS#	Analyte Name	Fraction	Method	MS/MSD % Recovery	MS/MSD or LD % RPD	LCS% Recovery	MS/MSD % Recovery	MS/MSD or LD % RPD	LCS% Recovery
SA0001	Alkalinity (to pH 8.3)	WC	EPA 310.1	75-125	20	75-125	75-125	20	70-130
SA0002	Total Alkalinity (to pH 4.5)	WC	EPA 310.1	75-125	20	75-125	75-125	20	70-130
SA0003	Ammonia	WC	EPA 350.2	75-125	20	75-125	75-125	20	70-130
SA0004	BOD	WC	EPA 405.1	75-125	20	75-125	75-125	20	70-130
SA0006	Chloride	WC	EPA 300.0	75-125	20	75-125	75-125	20	70-130
SA0007	COD	WC	EPA 410.2	75-125	20	75-125	75-125	20	70-130
SA0008	Cyanide, Total	WC	SW846 9012A	75-125	20	75-125	75-125	20	70-130
SA0011	Hexavalent Chromium	WC	SW846 7196A	75-125	20	75-125	75-125	20	70-130
SA0012	Nitrate/Nitrite	WC	EPA 300.0	75-125	20	75-125	75-125	20	70-130
SA0014	Orthophosphate	WC	EPA 365.3	75-125	20	75-125	75-125	20	70-130
SA0018	Total Dissolved Solids	WC	EPA 160.1	75-125	20	75-125	75-125	20	70-130
SA0019	Total Organic Carbon	WC	EPA 415.1/Kahn	75-125	20	75-125	75-125	20	70-130
SA0023	Total Sulfate	WC	EPA 300.0	75-125	20	75-125	75-125	20	70-130
SA0024	Total Suspended Solids	WC	EPA 160.2	75-125	20	75-125	75-125	20	70-130

NOTES:

(1) Franctions: VOA (Volatile Organic), SV (Semivolatile Organic), OCP (Organochlorine Pesticide), Diox/F (Dioxin/Furan), M (Metal), and WC (Wet Chemistry Parameter)

(2) NA - Not Applicable

(3) MS - Matrix Spike, MSD - Matrix Spike Duplicate, LD - Laboratory Duplicate

Table 6-4 **COLLECTION FREQUENCIES FOR FIELD QC SAMPLES**					
Analysis	Equipment Blank	Trip Blank	Duplicate Volume	Performance Evaluation Samples	Additional Duplicate Volume Needed for MS/MSD*
Volatile Organic Compounds	1/day average	1/day or 1/day cooler	1/20 samples	1/20 samples	triple volume per 20 samples or fewer
Other organic and inorganic consituents	1/day average		1/20 samples	1/20 samples	double volume per 20 samples or fewer

* MS/MSD = Matrix Spike/Matrix Spike Duplicate

TABLE 6-5
Required Containers, Preservatives, and Analysis Holding Times for Solid and Aqueous Samples

Fraction	Sample Bottles[1]	Preservative	Holding Time[2]
Soil/Solid Samples			
TCL Volatiles	1 - 4 oz. glass w/Teflon lined enclosure	Cool to 4° C	14 days
TCL Semivolatiles	1 - 8 oz. glass w/Teflon lined enclosure	Cool to 4° C	14 days till extraction/ 40 days to inject extract
TCL Organochlorine Pesticides/PCBs	From same 8 oz. above	Cool to 4° C	14 days till extraction/ 40 days to inject extract
Chloride, Sulfate, Ammonia, COD, Alkalinity	From same 8 oz. above	Cool to 4° C	28 days 14 days
Nitrate, Nitrite, o-Phosphate, BOD	From same 8 oz. above	Cool to 4° C	48 hours
Hexavalent chromium	From same 8 oz. above	Cool to 4° C	48 hours
TAL metals plus Tin	From same 8 oz. above	Cool to 4° C	28 days for Hg 180 days all other metals
Cyanides	From same 4 oz. as above	Cool to 4° C	14 days
Dioxins	1 - 4 oz. glass w/Teflon lined enclosure	Cool to 4° C	30 days till extraction/ 45 days to inject extract
TOC	From same 8 oz. above	Cool to 4° C	28 days
Trip Blank, Equipment Blank or Aqueous Sample			
TCL Volatiles	2 - 40 ml glass screw cap vials with Teflon septa	HCl to pH<2/Cool to 4° C	14 days
TCL Semivolatiles	2 - 1 liter amber glass with Teflon lined cap	Cool to 4° C	7 days till extraction/ 40 days to inject extract
TCL Organochlorine Pesticides/PCBs	2 - 1 liter amber glass with Teflon lined cap	Cool to 4° C	7 days till extraction/ 40 days to inject extract
Chloride, Sulfate, TDS, TSS, Alkalinity	1 - 1 liter HDPE	Cool to 4° C	28 days 7 days 14 days
Nitrate, Nitrite, o-Phosphate, BOD	1 - 1 liter HDPE	Cool to 4° C	48 hours
Hexavalent chromium	1 - 500 ml HDPE	Cool to 4° C	24 hours
TAL metals plus Tin	1 - 1 liter HDPE	HNO_3 to pH<2	28 days for Hg 180 days all other metals
Ammonia, COD	1 - 1 liter clear glass with teflon lined cap	H_2SO_4 to pH<2/Cool to 4° C	28 days
Cyanides	1 - 1 liter HDPE	NaOH to pH>12/Cool to 4° C	14 days
Dioxins	2 - 1 liter amber glass with Teflon lined cap	Cool to 4° C	30 days till extraction/ 45 days to complete analysis
TOC	1 - 125 ml glass with Teflon lined cap	H_2SO_4 to pH<2/Cool to 4° C	28 days

Notes:
1 - Depending on how sample analyses are distributed between the laboratories number and sizes of bottles may vary.
2 - Holding times are from the date of sample collection.

SECTION 7 - PUBLIC INVOLVEMENT PLAN

This section describes the program Pratt & Whitney will implement to inform the various local communities of the voluntary corrective action activities at each facility. To ensure that the work being performed at each facility is effectively communicated, Pratt & Whitney is planning to periodically prepare facility summary bulletins which will highlight the pertinent findings of the investigations, summarize planned stabilization measures, and describe the implementation of selected remedies. It is Pratt & Whitney's intent to prepare these summary bulletins as the work is completed at each facility. Consequently, it is expected that up to three bulletins would be completed for each facility at the following milestones:

- Upon completion of the modified RCRA Facility Investigation
- Upon selection of stabilization measures
- Upon implementation of stabilization measures

Pratt & Whitney is intending to notify local elected officials of the availability of the bulletins and to make the bulletins available at key locations in the local community, such as the public library. Pratt & Whitney will also announce the availability of the bulletins through notices published in a newspaper distributed state-wide as well as in at least one newspaper distributed in the local community. The public notices would run daily for one week. It is expected that the bulletins will remain available for public review for approximately four weeks. Pratt & Whitney will identify a contact person for receiving both written and oral comment on the program. It is expected that this communication will provide a suitable vehicle for responding to questions from the local communities.

In the event that it becomes apparent that an issue cannot be effectively communicated in this manner, Pratt & Whitney will utilize an appropriate alternative approach. These alternatives may include meetings with elected officials, public meetings, door to door communications in the affected area, etc. Because Pratt & Whitney does not believe it will be necessary to employ these measures, they are not described further herein.

APPENDIX A
MAIN STREET FACILITY DESCRIPTION
EAST HARTFORD, CONNECTICUT

November 22, 1996

Prepared by:

PRATT & WHITNEY
400 Main Street
East Hartford, Connecticut 06108

In Association With:

LOUREIRO ENGINEERING ASSOCIATES
100 Northwest Drive
Plainville, Connecticut 06062

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A1. SITE LOCATION AND DESCRIPTION

The Pratt & Whitney Main Street facility occupies 1096.6 acres of land in East Hartford, CT. Design, manufacturing, assembly and testing of aircraft engines and engine components take place at the Main Street plant. The western part of the site consists of the main factory complex, engine development and test facilities, a power house, the Centralized Waste Storage and Transfer Facility, the Concentrated Waste Treatment Plant, several office buildings, and several other auxiliary buildings. The eastern part of the facility consists of an airport with hangars and a control tower, an area which used to be used for experimental and test facilities (the Klondike, now demolished), and undeveloped land. This eastern part of the facility, everything east of the western boundary of Rentschler Field, is being prepared for sale or transfer separate from the main factory complex and will therefore be addressed separately in the VCAP because of the different goals for the two parcels.

The Main Street plant is bordered on the north by a residential neighborhood and Silver Lane, on the south by Brewer Street, on the west by Main Street and a residential area, and on the east by a residential area and Penney High School (Figure A-1). A site plan is provided in Figure A-2. Willow Brook runs through the north end of the complex in an east to west direction toward the Connecticut River. The brook is dammed and ponded in the vicinity of the Centralized Waste Storage and Transfer Facility. United Technologies Research Center (EPA ID # CTD095532131) (UTRC) located on the north central border of the Main Street plant, does not constitute part of the Main Street Facility.

A1.1 Site Use and Ownership

The majority of the property on which the plant is currently located was purchased by United Aircraft Corporation, now United Technologies Corporation, Pratt & Whitney from American Sumatra Tobacco Company in about 1929. At the time it was purchased, the eastern portion of the property, which subsequently became the Rentschler Airport and Klondike Areas, was used for the growing of tobacco. It should be noted that between 1941 and 1945 the manufacturing facility and the airport were leased by the U.S. government.

At present, there are approximately 6.5 million square feet of factory, office and warehouse space situated on approximately 300 acres of the site. Approximately 55 acres of grounds and 112 acres of parking lots, roads and walkways are maintained as part of the main complex. To the east of the main complex lies the airport (Rentschler Field) and an area formerly used for experimental test operations (Klondike).

Rentschler Field was dedicated in 1931 and at that time it was an all-turf airfield. In 1941 the hangars were moved and the runways were paved. Originally created as a test field, Rentschler Field was subsequently expanded into a service center for the overhaul and maintenance of Pratt & Whitney engines. The expansion of the airport included the construction of a control tower, the construction of an experimental laboratory, offices, and lengthening of the runways. In addition the south airport area includes the tanker storage area and the contractor storage area. United Technologies has not routinely used the airport since December 1994.

The first use of the Klondike Area occurred when the airport was modernized in 1945. The Tie Down Area was used to secure aircraft close to the runways. The Tie Down Area is located adjacent to the Perimeter Road and between the North and South access roads.

In the late 1950's, the Klondike Area was developed to include the buildings and test stands in the North Klondike Area, and the Linde Gas Plant, the Cryogenics Building and the Fire Prevention Pump House in the South Klondike Area. Subsequent expansions included the South Klondike Area, the Quonset Hut, the X-307 Test Stand, and the Storage Yards. A firing range also existed in the South Klondike Area, although the exact times of operation are unknown.

The majority of the Klondike Area remained active until the early 1980's when some test stands were dismantled and moved to other facilities. Through the late 1980's and early 1990's the use of the Klondike Area diminished. The buildings in the Klondike Area were razed in 1993 with the exception of the transformer room which is still standing in the South Klondike area. Part of the Klondike portion of the property has been undeveloped throughout its history.

A1.2 Review of Published Information

A1.2.1 City Directory Search

A search of historical city directory records was performed by Environmental Data Resources (EDR). The search did not locate any information for East Hartford.

A1.2.2 Fire Insurance Map Review

Database searches were performed to retrieve historical information available for the Pratt & Whitney, 400 Main Street site in East Hartford, Connecticut. LEA contracted with EDR to provide copies of all available fire insurance maps of the area.

The search revealed that twenty-four Sanborn® fire insurance maps were available for the general vicinity of the three Pratt & Whitney facilities. Maps were available for the following years: 1903 (2 maps); 1908 (3 maps); 1913 (4 maps); 1920 (4 maps); 1927 (3 maps); 1949 (3 maps); and 1968 (5 maps). However, the Pratt & Whitney sites were never directly mapped by the Sanborn Company.

The 1903 Sanborn® maps show that the Main Street area of East Hartford was primarily a mixture of residences and tobacco sheds. The area to the northeast of the Brewer Street - Main Street intersection is labeled as "vacant".

The 1908 Sanborn® maps show that the Main Street area remained primarily a mixture of residences and tobacco sheds. The area presently occupied by a portion of the United Technologies Research Center (UTRC) and Rentschler Airport was occupied at that time by the Silver Lane Pickle Company. The area to the northeast of the Brewer Street - Main Street intersection is still labeled as "vacant".

The 1913 Sanborn® maps show that the area remained essentially the same as it was in 1908: a mixture of residences and tobacco sheds along Main Street. The 1913 maps show the Connecticut Tobacco Company offices and warehouses along Willow Street, approximately 1000 feet east of Main Street. The 1920 Sanborn® maps show little change along Main Street in the area of the Main Plant. A post office is shown on the northeast corner of the Brewer Street - Main Street intersection and the Connecticut Tobacco Company facility remained on Willow Street. The Silver Lane Pickle Company factory is still present.

The 1927 Sanborn® maps show that the Main Street area has remained unchanged along the east side, however two auto repair facilities have been established along the west side. The Silver Lane Pickle Company remains, and the post office is still shown to the northeast of the Brewer Street - Main Street intersection. A service station is shown just to the north of the post office and two gasoline "tanks" are indicated.

The 1949 Sanborn® maps show a general outline of the Pratt & Whitney buildings on Main Street. The former American Sumatra Tobacco Company offices are shown, labeled as Pratt & Whitney Aircraft Company, and a general outline of the western edge of the main factory building appears. The power house is shown, as is the former Hamilton Standard Propellers company building south of the main Pratt & Whitney factory building. There was no mapping to the east, on the Pratt & Whitney property.

The 1968 Sanborn® maps show the Main Street site as belonging to Pratt & Whitney, but no mapping was done because admittance to the facility was refused. Mapping was not done to the east, probably because of the residential nature of the area. The area previously occupied by the

Silver Lane Pickle Company was marked as belonging to Pratt & Whitney, the pickle factory buildings were crossed off and the notation "all buildings removed" was evident on the maps.

A1.2.3 Topographic Map Review

EDR also reviewed historical topographic mapping. The Pratt & Whitney East Hartford Main Plant lies at the intersection of four quadrangles: Hartford North; Hartford South; Manchester; and, Glastonbury. EDR provided copies of most but not all historical topographic maps for the site. It should be noted that the information provided below is based solely on map comparison for the years available, and parts of the information provided may be incomplete due to incomplete mapping.

The 1952 topographic map shows the main facility at its present location and the Silver Lane Pickle Company facility in the vicinity of the current United Technologies Research Center (UTRC) building. The Manchester quadrangle was not available for this year.

The 1963/1964 topographic maps show the Silver Lane Pickle Company building removed and the UTRC building constructed; the main factory complex buildings were in place.

The 1968/1972 topographic maps show the Main Plant factory buildings unchanged since 1963/1964, and the office buildings in the Rentschler Airport were shown as constructed. There was evidence of some construction of small buildings in the Klondike area. The 1984 topographic maps show minor construction at the airport, and additional construction in the Klondike area. The 1992 topographic maps show some minor additions to the main factory buildings, an additional office building, some road construction, and some additional buildings in the Klondike area.

A1.2.4 Aerial Photograph Review

A survey of aerial photographs available for the site was also performed by EDR Sanborn, Inc. EDR's review indicated that the readily available photograph was from 1951. A color infrared photograph was reported to be available from 1986. The origins of the photographs were not reported. The photographs are available from National Aerial Resources, Inc.

In addition, aerial photographs of the facility were taken in April 1990 in an effort to obtain an accurate topographic map of the facility. The map developed based on the aerial photographs identified all buildings and roads at the facility at a scale of 1 inch equals 200 feet. A complete review of the aerial photos was not undertaken for the preparation of this document.

A2. ENVIRONMENTAL SETTING

A2.1 Land Use

The property surrounding the facility is zoned for residential, business and industrial use. Figure A-3 is an excerpt from the Town of East Hartford Zoning Map showing the facility and the surrounding area.

A2.2 Groundwater and Surface Water Classifications

The DEP has adopted water quality classifications for the groundwaters and surface waters of the state to categorize the existing quality of the water, the potential uses of the water, allowable discharges to the water, and the long-term state goals for water quality restoration. Surface waters and groundwaters are classified separately, and both classification schemes are based on the water quality standards adopted by the DEP.

The groundwaters beneath the facility have been classified by the DEP as GB. A classification of GB indicates groundwaters within highly urbanized areas or intense industrial activity and where a public water supply is available. Figure A-4 depicts the groundwater classification of the site and is based on the map "Adopted Water Classifications for the Connecticut River Basin" prepared by the DEP and dated June 1988. This map is also based on maps supplied to the DEP during a recent groundwater reclassification request and reflects the current groundwater classifications for the facility as acknowledged by DEP.

The surface water classification of the Connecticut River in the area is SC/SB denoting a surface water goal of SB (suitable to receive cooling water discharges and discharges from municipal and industrial wastewater treatment systems. Willow Brook is classified as a GB stream.

A2.3 Water Supplies

A review of the "Atlas of the Public Water Supply Sources & Drainage Basins of Connecticut" published by the DEP and dated June 1982 identified only two water supplies within a 1,000-foot radius of the facility. These two wells were properly abandoned in August of 1996 and have not been used since the late 1980s due to low demand.

A well search performed by EDR revealed the presence of several wells within the general area of the site as noted on Figure A-5. These wells are reported in EDR's database as water withdrawal wells for industrial use, or unused test wells. These wells seem to all be associated with the facility itself.

Loureiro Engineering Associates reviewed the records available at the Town of East Hartford. No public or private water wells were found during the record search within a ¼ mile radius of the regulated units at the facility. → what about within 1 mile?

A review of MDC records, which was also undertaken at that time, indicated that the plant and its surroundings are served by the MDC's public water supply. However, a house to house survey was not performed to confirm these findings. A private well is known to exist on a 4-acre residential parcel surrounded by the South Klondike Area (364 Brewer St., shown on the map as a shaded area near the southern corner of the Airport). Pratt & Whitney is in the process of abandoning this well and installing a connection to the MDC public water supply. who owns the well?

Potable water is presently supplied to the facility and greater East Hartford by the Metropolitan District Commission (MDC) of Hartford County. The closest public well fields are located in South Windsor, Manchester and Glastonbury, about 5 to 5½ miles northeast, east and southeast of the site, respectively.

A2.4 Floodplain Information

The surface water bodies of importance for floodplain information on this site are Willow Brook on the northern side of the site near the main facility and Pewterpot Brook, associated tributaries and wetlands on the southeastern part of the site. Near the main plant, the 100-year flood level is 33.3 feet and is located within the Willow Brook pond embankments. The 500-year flood level is 36.1 feet which would also be contained within the pond. Figure A-6 shows the 100- and 500-year flood boundaries for Pewterpot River and the unnamed tributary to Pewterpot Brook. Part of the southern portion of the Rentschler Airport and Eastern Klondike are within the 100- and 500-year flood plain.

A2.5 Surface Water Drainage

Surface water runoff on site is generally toward local surface waters, based on site topography. Much of the site shows little topographic relief. The Klondike Area in the eastern portion of the facility ranges from an elevation of about 50 to 60 ft above mean sea level NGVD[1] sloping westward toward the airport at about one percent. The central (airport) portion of the site is generally flat, with slopes less than 0.5 percent, ranging between elevation 38 in the southern part to elevation 48 in the northern part. The manufacturing complex area generally ranges from elevation 36 to 40. The northern portion of the site contains Willow Brook and Willow Brook

[1] National Geodetic Vertical Datum of 1929

Pond. Most of the portion of Willow Brook upstream of Willow Brook Pond flows in an underground culvert. Beyond the pond, Willow Brook flows generally westward, and empties into the Connecticut River adjacent to the Colt St. Facility. The Pewterpot River and an unnamed tributary flow in a westerly-southwesterly direction in the southern part of the Rentschler Airport. The southern part of the Rentschler Airport and eastern part of Klondike are within the inland wetlands area and associated buffer zone.

A2.6 Regional Geology

The Pratt & Whitney Main Street facility lies in the Central Lowlands province of Connecticut, a north-south trending valley system which is approximately 20 miles wide at East Hartford. The lowland consists of a series of parallel valleys separated by linear north-south trending ridges. The Connecticut River flows southward immediately west of the site, draining the northern part of the valley system. The river has created a broad floodplain and eroded terraces in the flatter portion of the valley system.

The unconsolidated sediments in the region were deposited during, and following, the most recent period of glaciation, which ended approximately 10,000 years ago. These materials can be divided into three major units: glacial till and ice-contact stratified sediments, glaciolacustrine deposits, and post-glacial fluvial and eolian deposits. The three units were deposited in the order noted above, with the till and ice-contract sediments generally lying directly over bedrock.

The till is poorly sorted and varies widely from a non-compact mixture of sand, silt, gravel, and cobbles, with trace amounts of clay, to a compact mixture of silt and clay with some sand, gravel, and cobbles. Locally, units consisting of sand and gravel deposited in contact with the ice are present beneath the glaciolacustrine sediments. Glaciolacustrine materials consist of both silt and clay deposited in a glacial lake and sand and gravel deposits formed by beaches and deltas in the lake. These materials may be as much as 270 feet thick in the vicinity of the site.

Post-glacial fluvial sediments consist of sand and silt deposited as the Connecticut River flowed across the exposed deposits of the former lakebed and cut stream terraces into the exposed lacustrine clays and silts. These stream terraces are laterally extensive in the vicinity of the site, and are typically 15 to 30 feet thick. In addition, a thin veneer of eolian (wind-blown) sediments was deposited over parts of the area. These deposits typically consist of yellowish-brown fine- to medium-grained sand and silt. These deposits are only locally important.

The bedrock geology of the region consists of sedimentary and igneous rocks. The bedrock stratigraphy consists of four sedimentary rock formations: the New Haven Arkose and the

Shuttle Meadow, East Berlin, and Portland Formations, which are separated by interbedded, laterally continuous basalt flows. The sedimentary units are composed predominantly composed of interlayered gray or reddish siltstones, sandstones, and conglomerates. The bedrock layers dip to the southeast at approximately 10 to 45 degrees towards the Eastern Border fault, which is located approximately 8 to 9 miles east of the site.

A2.7 Site Geology

Post-glaciolacustrine fluvial deposits occur across the site and generally range from 15 to 30 feet in thickness, increasing in thickness toward the central part of the site where greater erosion of the top of the glaciolacustrine silt and clay may have occurred along an ancient channel of the Connecticut River. These deposits generally consist of uniform brown fine or fine to medium sand. Recent laminated silt and sand alluvium occurs near the western boundary of the site along the present course of the Connecticut River. This alluvium is thickest near the Connecticut River and likely interfingers with the older stream terrace deposits. Other recent alluvial deposits are found scattered across the site near existing and former streams (e.g., Willow Brook) or wetland areas.

Glaciolacustrine lake bottom sediments occur over most of the site and range up to 270 feet in thickness. These deposits thicken towards the central part of the site (near the main factory complex) and are generally absent near the eastern boundary of the site (the Klondike Area). These deposits consist of laminated (varved) silts and clays with red fine sand partings. The color varies from grey near the surface to red at the base of the unit.

Beneath the eastern portion of the site, the contact between the silt and clay and overlying post-glacial sediments is distinct. However, in the vicinity of the main factory complex, an intermediate layer of fine sand and silt that varies from approximately 5 to 20 feet thick occurs between these two deposits. A similar zone may occur at the base of the glaciolacustrine unit as well.

On-site investigations have indicated that local sand or gravel lenses of glaciofluvial origin are present within the glaciolacustrine unit near its base. However, these lenses do not appear to be laterally extensive.

A layer of glacial till, up to 10 feet thick, typically directly overlies bedrock beneath the site. However, a gravelly sand ice-contact stratified drift deposit has been documented above or in place of the till in a few isolated instances.

Bedrock beneath the site consists of red sandstone and siltstone of the Portland Formation. Depth to bedrock within the study area is over 300 feet in the area of the main factory complex, and approximately 30 feet along the eastern property boundary in the Klondike Area (except at one location, where bedrock was encountered at about 12 feet). Near the Connecticut River (west of the site), depth to bedrock is about 150 feet. A north-south trending buried bedrock valley underlies the main factory complex. This buried valley may have been a pre-glacial channel of the Connecticut River.

A2.8 Regional Hydrogeology

The Pratt & Whitney Main Street site is located within the Upper Connecticut River Regional Drainage Basin. Regional flow in this part of the basin is expected to be toward the Connecticut River to the west, although local groundwater flow would be controlled by local geologic conditions and anthropogenic features, such as production wells.

There are four distinct saturated hydrogeologic units in the shallow subsurface within the region (from uppermost to lowest): (1) glaciolacustrine silt and sand deposits and post-glacial fluvial deposits; (2) glaciolacustrine clay and silt deposits; (3) till and ice-contact stratified sediments; and (4) sedimentary bedrock (the Portland Formation).

The post-glacial fluvial deposits comprise the majority of the upper aquifer and generally constitute the most important aquifer in the region, primarily due to the saturated thickness and extent. The unconfined aquifer is relatively coarse-grained and supplies much of the groundwater used for municipal and industrial purposes in the region.

The majority of the glaciolacustrine deposits are comprised of silt and clay. These sediments have low permeability and function as a confining layer. The glaciolacustrine unit also includes limited sand and gravel lenses and areas of sandy beach and deltaic deposits. These deposits may be locally important as aquifers, but are of limited areal extent.

Glacial till is generally thin and discontinuous, poorly sorted, and contains large amounts of silt and clay, although sandy zones exist. This unit is usually a poor aquifer and is rarely used even for domestic production. Ice-contact stratified sediments beneath the silt and clay layer may be coarse-grained and capable of producing large amounts of water, but these deposits are not laterally extensive and are therefore only locally important.

The Portland Formation consists of southeastward-dipping, well-cemented beds of sandstone and siltstone. Groundwater flow in the bedrock is primarily within fractured and faulted zones. The

Portland Formation is an important source of water for domestic use, but yield is generally not sufficient for large-scale users.

A2.9 Site Hydrogeology

The upper zone of the unconsolidated aquifer, which occurs within the stream terrace and glaciolacustrine silt and sand deposits, is the aquifer zone of greatest interest because of the shallow occurrence of economic quantities of groundwater for use, its proximity to potential sources of contamination, and its interconnection with surface water systems. The uppermost zone of this unit is largely composed of well-sorted medium to fine sand, with a saturated thickness generally ranging from 10 to 20 feet. Saturated thicknesses are generally greater towards the center of the site where the stream terrace deposits thicken, and less in the eastern portion of the site (Klondike Area) where bedrock approaches the ground surface.

Water-level measurements collected in February 1991 indicated that groundwater within the upper aquifer generally flows from east to west across the site, toward the Connecticut River. Groundwater was expected to also flow locally toward Willow and Pewterpot Brooks, which cross the site. However, the monitoring well coverage prohibited further evaluation of the locations of local groundwater flow divides; the site-wide program was designed to evaluate these local devices.

The depth to water in the upper zone of the unconsolidated aquifer ranges from approximately 1 to 13 feet below grade. Groundwater flow gradients in this aquifer are quite variable across the site, but are generally gentler in the central portion and steeper in the Klondike Area (eastern portion) and adjacent to the Connecticut River (western portion).

The upper aquifer provides large volumes of water to the numerous on-site production and dewatering wells. Production wells were installed within or adjacent to the main facility buildings in 1941. Only three of these wells are currently in operation; PW-03 is no longer in operation, and PW-05 has been abandoned. Thirteen additional production wells were installed in the South Airport Area and Main Plant Area between 1942 and 1954. Historically, these wells were used as a source of potable water and process water. In 1983, one of those wells was replaced.

In 1966, the combined yield of these production wells was as high as 850 gpm. Total pumpage at the plant, including the basement dewatering network during the most recent water well observation period, was approximately 535 gpm. During that event, combined yield of the current basement dewatering network was measured at approximately 235 gpm.

The glaciolacustrine deposits under the site consist almost entirely of lake bottom silt and clay, and are considered to be a confining unit, or aquitard, inhibiting downward flow from the upper aquifer throughout most of the site. This consideration is due to the fact that these sediments are composited of finely-laminated silt and clay, can be up to 270 ft. thick, and are laterally extensive. A slug permeability test conducted in 1990 on a well screened within this unit indicated a horizontal hydraulic conductivity of 2.3 X 10^{-6} cm/sec (6.5 x 10^{-3} ft/day).

The glacial till and ice-contact stratified sediments form a thin, discontinuous layer directly above the bedrock and, therefore, represent a relatively insignificant hydrogeologic unit. Pratt & Whitney previously operated a production well, which drew water from a gravelly deposit overlying bedrock (This well was initially completed in bedrock; however, due to low yield, the bedrock portion of the well was backfilled with sand). This deep overburden well likely withdrew water from an ice-contact stratified drift deposit or from a relatively sandy zone with the glacial till.

The bedrock aquifer is not currently used by Pratt & Whitney for water supply, although it has been in the past. Three wells were drilled into the bedrock; but only one was used as a bedrock production well. This well was completed in bedrock and yielded approximately 220 gallons per minute (gpm) on a continual basis from 1939 until about 1966. The portion of this well below the stream terrace deposits was subsequently filled in, when the pump shaft broke within bedrock. The well was then screened within the stream terrace deposits. Very limited information is available on water levels or groundwater flow in bedrock beneath the site.

Groundwater flow in the vicinity of the site generally follows the direction of regional flow, westerly to the Connecticut River. However, the local groundwater flow direction may be influenced by various factors. One such factor is the interaction between local surface water bodies and the groundwater system; a second factor is the influence of manmade features (e.g., utilities). Groundwater flow patterns indicate that the local surface water drainage systems, consisting of Willow Brook, Pewterpot Brook, and their respective tributaries, likely act as groundwater discharge points.

→ Contractors? Consultants? Lessee? Owners?

Pewterpot Brook and its tributaries drain the majority of the eastern and southern portions of the property. The first tributary, designated the Klondike Tributary by Westinghouse, flows within a dug ditch which runs north-south, adjacent to the airport perimeter road, parallel to the easternmost runway. The second major tributary to Pewterpot Brook, designated the Suntan Tributary by Westinghouse, runs northeast-southwest and crosses the South Airport Area in a

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buried culvert. This tributary emerges from the culvert at a small pond which was originally excavated in an effort to increase yields for the adjacent South Airport well network.

Previous measurements of baseflow in Pewterpot Brook and its tributaries made by Westinghouse in January 1991 indicated the likelihood that these streams serve as groundwater discharge areas. In the most recent water level data set, surface water elevations were typically lower than nearby groundwater levels, further suggesting that the Pewterpot Brook system serves as a groundwater discharge region. The normal westerly groundwater flow pattern is modified by apparent discharge to Klondike Tributary and Suntan Tributary on the western edge of the Klondike. Production wells on both sides of the lower reaches of Suntan Tributary, probably acted to artificially lower local groundwater elevations.

Willow Brook also appears to serve as a groundwater discharge area. Surface water elevations at the United Technologies Research Center property, where Willow Brook enters a culvert, were slightly lower than surrounding groundwater elevations, indicating groundwater discharge to the brook. Willow Brook re-emerges approximately 3,000 feet to the southwest at Willow Brook Pond. In the vicinity of the pond, water level data indicate a surface water elevation higher than local groundwater elevations. Groundwater is likely artificially recharged to some extent by the ponding of the brook here.

A3. WASTE MANAGEMENT

A3.1 Facility Operations

The facility is involved in the manufacture, development, and testing of jet engines and jet engine components. Materials and processes used in those operations generate or have generated large quantities of wastes. These wastes include or have included industrial wastewaters, dilute oily wastes, characteristic hazardous wastes (ignitable, corrosive, reactive and TCLP Toxic) and listed hazardous wastes (e.g. - spent solvents).

Pratt & Whitney also utilizes or has utilized a wide variety of products that are hazardous wastes such as acids, alkalies, cyanides, alcohols, metal plating solutions, specialty solutions, fungicides, epoxy, cleaners, resins, paints, solvents, fuels, and many commercial chemical products listed in 40 CFR 261.33(e) and (f). PCB wastes have also been generated on site.

Specific processes which use the above products and which result in the generation of hazardous wastes include or have included the processes listed below. Note that processes followed by an asterisk (*) have virtually been eliminated on site based on present operations.

- Product rinsing, stripping, cleaning, degreasing, alkali and acid cleaning, vapor degreasing*, salt bath descaling;
- Electroplating, etching, plating, anodizing, heat treating, electroless plating, painting operations, acid treatment (pickling), chromate conversions*;
- Abrasive jet machining, chemical machining, electrochemical machining*, electrical discharge machining, general machining;
- X-ray testing, fluorescent penetrant inspection, magnetic penetrant inspection, photo developing; and;
- Sludge removal, solvent reclamation*, battery replacement spill cleanup, process decontamination, cleaning fuel systems, remediation and decommissioning activities, removal of obsolete materials, machine oil changes, general maintenance and housekeeping activities.
- Vapor degreasing has virtually been eliminated on site. Only one, closed loop vapor degreaser is currently in operation. Solvent reclamation no longer occurs on site. ECM and chromate conversions are also limited or non-existent now.

A3.2 Waste Generation, Handling, and Characteristics

Types of waste generated on site and the processes that generate them are described in the surrounding sections. Wastes are either collected in containers at the point of generation areas and then moved when containers are full to the appropriate storage areas, or they are transferred directly to a collection/conveyance system. Wastes not conveyed directly to treatment and disposal, or not treated on site, are stored in various <90 day storage areas and may be moved from there to the Centralized Waste Storage & Transfer Facility (CWS&TF) for greater than 90-day storage area) in preparation for shipment off-site. For a discussion of other former >90 day storage areas see section 2.3.4.1.

Hazardous wastes are also received at the East Hartford complex from other UTC sites. These wastes are received for storage and/or treatment in the CWS&TF. The wastes are typically concentrated wastewater solutions and spent solvents. All the wastes received at East Hartford are similar or identical to those generated East Hartford. These off-site wastes are also stored and treated in the NPDES permitted treatment System along with similar on-site wastes.

Wastewaters are separated into two major categories for treatment and disposal, namely the concentrated and dilute waste streams. The dilute waste streams consist only of rinse waters from various wet chemical operations and the concentrated wastes include all other solutions. Both the dilute and concentrated wastes are segregated into acids, alkalies, chromes, cyanides, and oily wastes. Several dilute industrial wastewater and dilute oily waste collection and pumping systems have been installed to provide proper containment, storage and transfer of the various wastewaters to the Pratt & Whitney Concentrated Waste Treatment Plant (on Willow St.) and Industrial Wastewater Treatment Facilities (Colt St. facility). The dilute chrome, cyanides, and acid-alkali rinse waters are pumped to a pretreatment system at the 400 Main Street facility. In the pretreatment area, the chrome rinse water is put through a chemical reduction treatment to change hexavalent chrome to trivalent chrome. Also in the pretreatment area, the cyanide rinse water undergoes a two-step chemical oxidation to destroy cyanide. The effluent from the cyanide and chrome treatment systems is combined with the acid-alkali rinse water in a wet well for transfer via pipeline to the industrial wastewater treatment system at the Colt Street site. The dilute oily rinse waters are transferred directly to the Colt Street site via pipeline. All dilute wastewater systems are continuous flow.

Pratt & Whitney maintains information on the various process solutions used at the facility. The individual components of these solutions are identified by process material control (PMC) or

Pratt & Whitney numbers (PW). These solutions are made with virgin material (e.g., acids, alkalies, chromium compounds, and cyanides).

Solutions are/were discarded for various reasons. For example, acid solutions are/were sometimes discarded if they became dilute, or portions of the solutions are/were sometimes discarded if they were too concentrated. Other solutions are/were discarded when they can/could no longer adequately perform their designated function. The types of waste that are or were generated at the East Hartford facility are further described below.

- **Acids**

Pratt &Whitney uses or has used several acids in its production processes. Examples of typical acids used are Hydrochloric, Nitric, Sulfuric, Hydrofluoric, Phosphoric, Muriatic, and Acetic acids, and Hydrogen Peroxide. The resulting acid wastes are/were spent acid-water solutions in varying concentrations. Acid wastes are/were treated by neutralization in the NPDES permitted pretreatment plant, after which the neutralized solution flows/flowed to a final treatment plant at the Colt Street facility for metals removal. The only exception is hydrogen peroxide which is/was removed to an off site disposal facility due to the extremely dangerous nature of the material.

Solid sludges resulting from the accumulation of solids at the bottom of the acid tanks are/were also generated. These wastes are/were stored on-site and disposed of off-site at RCRA-permitted Treatment Storage Disposal Facilities (TSDFs).

- **Alkalies**

Pratt & Whitney uses or has used several alkalies in its production processes. Examples of typical alkalies used are Sodium Carbonate, Sodium Bicarbonate, Sodium Hydroxide, Potassium Hydroxide, Potassium and Sodium Nitrate, Trisodium Phosphate, Ammonium Hydroxide, and Silicates. The resulting alkali wastes are/were spent alkali/water solutions of varying concentrations. Alkali wastes are/were treated by neutralization in the NPDES permitted pretreatment plant, after which the neutralized solution flows/flowed to a final treatment plant for metals removal. The only exception is Ammonium Hydroxide which is/was removed to an off site disposal facility due to the extremely dangerous nature of the material.

Solid alkali salts or sludges resulting from accumulation of solids at the bottom of alkali tanks are/were also generated. These wastes are/were stored on-site and disposed of off-site at RCRA permitted TSDF's.

- **Chromium**

Pratt & Whitney uses or has used several chromium compounds in its production processes. Examples of typical chromium compounds used are Chromic Acid, Sodium Dichromate, Chromium Permanganate, and Potassium Dichromate. The resulting chromium wastes are/were spent chromium/water solutions of varying concentrations. Chromium wastes are/were treated by chemical reduction in the NPDES permitted pretreatment plant, after which the treated solution flows to the final treatment plant for metals removal.

Solid sludge resulting from the accumulation of solids at the bottom of chromium tanks are/were also generated. These wastes are/were stored on-site and disposed of off-site at RCRA permitted TSDF's. It should be noted that chromium wastes are no longer being generated in large quantities on site.

- **Cyanide**

Pratt & Whitney uses or has used several cyanide compounds in its production processes. Examples of typical cyanide compounds used are Sodium Cyanide, Potassium Cyanide, Copper Cyanide, Gold and Silver Cyanide, Potassium Silver Cyanide, and Potassium Gold Cyanide. The resulting cyanide wastes are/were spent cyanide/water solutions and sludges of varying concentrations. Concentrated cyanide waste solutions are/were shipped to a commercial waste treatment facility for alkaline oxidation of the cyanide. Dilute cyanide waste water is/was treated by alkaline chlorination on-site in an NPDES permitted pretreatment plant, after which the treated solution flows/flowed to a final treatment plant for metals removal. Precious metal cyanide compounds are/were sent to an off-site vendor for metals reclamation.

Solid sludges resulting from the accumulation of solids at the bottom of cyanide tanks are/were also generated. These wastes are/were stored on-site and disposed of off-site at RCRA permitted TSDF's.

It should be noted that cyanide wastes are no longer being generated in large quantities on site any more. Most cyanide wastes generated now are laboratory type wastes. As a result, the dilute cyanide wastewater treatment system has been shut down.

- **Organics**

Pratt & Whitney uses or has used solvents in degreasing, cleaning and laboratory operations, generating spent solvent wastes which are disposed of by off-site incineration. Typical solvents that may have been used at the facility based on information provided at the RCRA Part B Permit Application included trichloroethane, trichloroethylene, tetrachloroethylene, methylene chloride, benzene, tetrachloride, chlorobenzene, chloroform, 1,1-dichloroethylene, hexachloroethane, methyl ethyl ketone, nitrobenzene, pentachlorophenol, pyridine, vinyl chloride, acetone, n-butyl alcohol, isobutyl alcohol, carbon tetrachloride, toluene, methanol, and methyl chloroform. These solvent wastes are in liquid form.

Various organic solids are/were also generated. Examples of typical organic solids generated at the facility include still bottoms, tank sludges, soil contaminated with organics, maskant waste contaminated with organics, and solvent contaminated rags. The degreaser still bottoms and tank sludges were liquid to semi-solid depending on the percentage of wax present and were disposed off site. It should be noted that only one vapor degreaser still remains on the site using tetrachloroethylene.

- **Oils**

Pratt & Whitney uses oils in various machining operations including hydraulic, cutting and lubricating oils. On rare occasions, the oils may be contaminated with organic solvents and may exhibit the toxicity characteristic for one or more constituents. If they contain a listed waste or exhibit a hazardous characteristic, they are classified as hazardous. However, at present the majority of the waste oils are non-hazardous in nature. Oils are classified/reclassified frequently through sampling and analysis for polychlorinated biphenyls (PCBs), total organic halogens (TOX), and volatile organic compounds (VOCs). Waste oils were disposed off site, but were historically also burned on site for heat generation.

- **Paint Wastes**

Pratt & Whitney uses paints and associated paint solvents in industrial and facility painting operations. Examples of typical paints and paint solvents that are currently or were previously used are latex-based paints, oil-based paints, turpentine, naphtha, stoddard solvent, mineral spirits, petroleum solvent, and lacquer thinner Waste paints and paint solvents are disposed of by off-site incineration. Examples of waste paints are liquid paint or solvents contaminated with paint and solid or semi-solid paint sludges containing paint solvents.

- **Inorganic Solids**

Pratt & Whitney generates or has generated waste inorganic solids and sludges Typical waste inorganic solids generated are/were tank sludges, soils contaminated with inorganics, and other remediation wastes. These wastes were hauled off site for disposal via a licensed vendor.

- **Laboratory Chemicals and Commercial Chemical Products**

Pratt & Whitney has several major laboratory facilities which produce waste laboratory chemicals. Pratt & Whitney purchases many commercial chemical products for use in its plants. All of these items may become waste products through obsolescence or expired shelf life. Examples of typical laboratory and commercial chemical product wastes include small quantities of laboratory chemicals including acids, alkalies, salts, solvents, organics, inorganics, and small quantities of commercial chemical products such as resins epoxies, chemical coatings, cleaners, lubricants, absorbents, and polymers. These wastes were hauled off site for disposal via a licensed vendor.

A3.3 Waste Disposal Practices

Waste is disposed of through permitted commercial waste disposal facilities if it is not treated on site. Wastewaters able to be treated on site or at the Colt St. facility are disposed of through treatment in the NPDES-permitted treatment system. For a description of the specific means of waste disposal for each type of waste generated at the facility, please refer to section 2.3.3.3.

A4. SUMMARY OF EXISTING CONDITIONS

A4.1 Regulatory Status

The facility has filed RCRA Part A and RCRA Part B Applications (EPA ID# CTD990672081). A RCRA Part B Permit has been issued. Several interim status units exist at the facility. They are no longer used for >90 day storage of wastes. These interim status units include CWTP-1 through CWTP-6 and the former storage area at the South Airport Area. Closure plans have been submitted for all interim status regulated units at the facility. These units are awaiting closure plan approval. The only exception is the Burn-Zol hazardous waste incinerator which has been closed in accordance with an approved closure plan. The Centralized Waste Storage & Transfer Facility (CWS&TF), is currently the only unit at the facility operating under a RCRA Part B Permit status for greater than 90-day storage.

A4.2 Known Releases

Several sources were reviewed to identify previous spills that have occurred at the Main Street facility. A search performed by EDR Sanborn®, Inc. revealed that over 400 spills have been reported to the DEP at the 400 Main Street facility. Only a survey of the files maintained by the Oil & Chemical Spills Division of the DEP was performed, and a list of spills at the facility has not been compiled.

A4.3 Facility Investigations

Investigations performed at the East Hartford facility included the Concentrated Waste Treatment Plant (CWTP) Area field investigation, the Rentschler Airport and Klondike Areas Data Gap Investigation, and numerous minor investigations such as the Klondike Septic System Investigation and the Steam Tunnel Investigation. The following discussion outlines the investigations performed only briefly below, since the results are available elsewhere.

Four septic systems in the Klondike Area were investigated during the Klondike Septic System investigation. These included the Storage and Maintenance Building Septic Tank, the Former Locker Room Septic Tank, the Cryogenics Building Septic System, and the Former Test Stand X-307 Septic System. The purpose of the investigation was to asses soil and groundwater conditions in these areas (Loureiro Engineering Associates, November 1994).

The Steam Tunnel investigation was in the area of a historic release of waste oil that occurred in 1978 due to a break in a pipeline from the CWTP to the powerhouse. The waste oil contained chlorinated solvents and PCBs. The intent of the most recent investigation (Loureiro Engineering Associates, 1996) was to characterize the degree and extent of contamination in the Steam Tunnel area to provide the basis for a feasibility study of potential remedial options for the area.

The CWTP Area investigation was initiated to characterize soil and groundwater at environmental units within the CWTP Area (Loureiro Engineering Associates, May 1995). An extensive investigation was also performed in the Rentschler Airport and Klondike Areas to characterize soil and groundwater conditions at various potential environmental units throughout these areas (Loureiro Engineering Associates, October 1995).

For the purpose of the voluntary corrective action plan the Main Street facility has been divided into several study areas. Environmental units identified at the facility are discussed in the following section.

A4.4 Identification of Environmental Units

Seventeen Areas of Concern (AOCs) have been identified at the Main Street facility. These AOCs were identified by A.T. Kearney, Inc. in the "Initial Assessment and Stabilization Evaluations of RCRA Facilities" report prepared for EPA, Region 1 (no date stated in the document). The AOCs are identified in Table A-1, along with environmental units that have been identified in site investigations conducted to date. Previously identified AOCs have been re-numbered as Environmental Units for the purposes of the VCAP. These numbers are also included in Table A-1. As noted in the previous section, investigations performed at the facility included the CWTP Area and the Rentschler Airport/Klondike Area investigations. It should be noted that since the Airport/Klondike parcel is being prepared for potential property transfer, there is much more detail about this area than other areas of the site. This is evidenced by the EUs associated with that area of the site as opposed to the rest of the site.

A4.5 Remediation Activities

Remedial activities performed at the facility include the operation of a soil vapor extraction in the vicinity of the former Department 1210 (D1210) degreaser in A Building near column C13; soil vapor extraction in the South Klondike Storage Area 3; and the removal of free oil product in the steam tunnel area.

Soil vapor extraction was selected as an interim measure for the remediation of the conditions identified in the vicinity of the former D1210 degreaser. It was implemented in 1993 immediately after the extent of contamination was defined. Approximately 1,460 pounds of volatile organic compounds were removed during 210 days of operation. The remedial system has since been removed.

Similarly, soil vapor extraction was chosen to remediate conditions identified in Storage Area 3 (also known as Virgin Product Storage Area). The implementation of soil vapor extraction in this area was conducted to determine the applicability of the technology in the treatment of this area due to the seasonally elevated water table. Approximately 2,100 pounds of volatile organic compounds were removed during the 74 days of operation of the unit. The system proved to be infeasible due to the high water table (within 1 to 2 feet from ground surface). Other remedial measures are currently being considered.

In addition, product recovery systems have been historically utilized in the vicinity of the Powerhouse Steam Tunnel at the East Hartford facility. The latest recovery system implemented consisted of two product pumps, two oil/water sensing interface probes, and a control unit. The recovery system is currently shut down and a different system is being considered. The quantity of LNAPL removed by the product recovery system estimated based on the measurements of waste oil accumulated in the fluid collection drums, amounted to approximately 90 gallons of waste oil. Approximately 540 gallons of contaminated groundwater were removed in addition to the waste oil.

TABLES

Table A-1
IDENTIFICATION OF ENVIRONMENTAL UNITS
Main Street Facility
East Hartford, Connecticut

EU ID	AOC ID	Name	Description
1		Container Storage Area 1, CWTP Area	This was a former storage area for drums and other containers. The materials managed are unknown, but PCB oils are likely
2		Container Storage Area 2, CWTP Area	This was a former storage area for drums and other containers. The materials managed are unknown, but PCB oils are likely
3		Former Lagoons, CWTP Area	Six surface impoundments were used for dewatering and temporary storage of sludge from concentrated waste water treatment. The materials managed included oils, metal hydroxide sludges, cyanide, alkali, and acid solutions.
4		Former USTs (3) , CWTP Area	Three underground storage tanks were removed in 1991. They were 10,000 gallons in size and contained diesel fuel, unleaded gasoline, and leaded gasoline.
5		Lime Storage tanks, CWTP Area	Two underground storage tanks arc used for a lime slurry. The are approximately 12,000 gallons in size and are still in operation. The lime slurry is from acetylene production and possibly contains cyanide.
6		508348 Degreaser, CWTP Area	The 508348 degreaser was a 100 gallon capacity degreaser unit near the west wall of the maintenance building. 1,1,1-Trichloroethane was used here.
7		385906 Degreaser, CWTP Area	The 385906 degreaser was a 50 gallon capacity degreaser unit located near the west wall of the maintenance building.
8		Oil Handling Area, CWTP Area	The Oil Handling area is a buried trench containing transfer lines for oil and was used from approximately 1960 until 1991.
9		Former Oil House, CWTP Area	The Former Oil House was a receiving and distribution facility for virgin oils, and was used from approximately 1960 until 1991.
10		Hydraulic Lifts, CWTP Area	The Hydraulic Lifts were used during the maintenance of company vehicles from approximately 1963 until the 1990's.
11		CWTP Building, CWTP Area	The CWTP Building is used for concentrated waste treatment. Materials managed includes oils, solvents, heavy metals, and cyanide

Table A-1
IDENTIFICATION OF ENVIRONMENTAL UNITS
Main Street Facility
East Hartford, Connecticut

EU ID	AOC ID	Name	Description
12		Former Soil Pile Storage Area, CWTP Area	The Former Soil Pile Area was used for stockpiling contaminated soil excavated during removal of underground storage tanks. It was used in September and October of 1988. Materials managed included soil contaminated with waste oils which may have contained solvents.
	1	Satellite Accumulation Areas Due to the large number of satellite accumulation areas, over 200, this was not assigned an EU number.	There are greater than 200 Satellite Accumulation Areas (SAAs) located in process areas such as the x-ray shop, paint shop, degreasing area, deburring area and rubber maskant process area. The typical SAA at the facility consists of two 20-gallon fiber type satellite containers, one for hazardous waste rags/debris with solvents and one for non-hazardous waste oily debris. A few SAAs have a third container for bulk waste liquid solvents. According to the facility, up to 55 gallons of hazardous waste or one quart of acutely hazardous waste are allowed to accumulate at or near the point of generation providing that the containers are in good condition; the waste is compatible with the container; the container remains closed except when waste is being added or removed; the container is clearly marked "Hazardous Waste" and the contents are clearly identified; and the accumulation dates are properly labeled. In general, once these quantities of waste are met, the containers are moved to the Centralized Waste Storage and Transfer Facility (AOC 4) within 72 hours. Rags, debris and absorbents contaminated with hazardous wastes, as well as spent solvents are managed by the SAAs.
13	2A	Less-Than-90-Day Hazardous Waste Storage Areas-Main Oil House	The Main Oil House Less-Than-90-Day Storage Area (AOC 2A) consists of a drum accumulation area in the main process room. There is also one less-than-90-day 5,000-gallon waste tank located at the unit. The facility began using the tank when the distillation process was discontinued in the Reclamation Area (AOC 3). Waste oils, waste solvents, and bulk solids from remediation are managed in the Main Oil House Less-Than-90-Day Storage Area (AOC 2A). One 5,000-gallon tank accumulates waste 1,1,1-trichloroethane.

Table A-1
IDENTIFICATION OF ENVIRONMENTAL UNITS
Main Street Facility
East Hartford, Connecticut

EU ID	AOC ID	Name	Description
14	2B	Less-Than-90-Day Hazardous Waste Storage Areas-New Oil House	The New Oil House Less-Than-90-Day Storage Area (AOC 2B) replaced the Former Oil House (AOC 17). There are six aboveground 800-gallon tanks in the unit used for blending and processing of new, reclaimed and/or used oils. The oils are blended to specification and are stored in drums or USTs. Each drum is sampled for analysis of volatile organic compounds (VOCs), PCBs, halogens, water content, and viscosity. Waste oils that cannot be reclaimed are classified as either B-1 (non-chlorinated, less than 1,000 ppm chlorine, and non-PCB-containing, high flash oil); B-2 (chlorine-containing, greater than 1,000 ppm chlorine, but non-solvent-containing); or B-3 (chlorine-containing due to cross-contamination with a solvent). These oils are transferred to the Tank Farm USTs (CWTP-3) (AOC 5C). A waste 1,1,1-trichloroethane less-than-90-day tank was put in the unit, according to a CTDEP Inspection conducted in May 1992. The New Oil House Less-Than-90-Day Storage Area (AOC 2B) receives waste drums of chlorinated oils, low flash petroleum distillates, 1,1,1-trichloroethane-contaminated oils, and other petroleum-based materials.
15	2C	Less-Than-90-Day Hazardous Waste Storage Areas-X Test Oil House	The X Test Oil House Less-Than-90-Day Storage Area (AOC 2C) is located in a building at the Engine and Experimental Testing Facility. The base of the unit is constructed of concrete. According to a CTDEP Inspection conducted in February/March 1994, 55-gallon drums of hazardous waste aerosol cans, non-hazardous waste engine oil, and non-hazardous waste oil rags were stored in the X Test Oil House Less-Than-90-Day Storage Area (AOC 2C). There was also a 55-gallon drum for draining used oil filters, which were managed as non-hazardous waste. Lab pack waste and numerous one-gallon cans of paint were also stored at the unit.
16	2D	Less-Than-90-Day Hazardous Waste Storage Areas-Container Storage Building at Rentschler Airport	The Container Storage Building at Rentschler Airport Less-Than-90-day Storage Area (AOC 2D) is located in a small metal building with a concrete floor and epoxy coating. Hazardous and non-hazardous waste oils, waste jet fuels and waste solvents (D001 stoddard solvent), that are generated in the aircraft support shop, are managed in drums at the Container Storage Building at Rentschler Airport Less-Than-90-Day Storage Area (AOC 2D).

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17	2E	Less-Than-90-Day Hazardous Waste Storage Areas-Rolloff Staging Area	The Rolloff Staging Area Less-Than-90-Day Storage Area (AOC 2E) stores solid debris generated from remediation projects. The storage area is in the vicinity of the Concentrated Waste Treatment Plant (AOC 5) and has an asphalt base. According to a CTDEP Inspection conducted in February/March 1994, the base was cracked and split in many areas. There were sixteen 20-cubic-yard or 30-cubic-yard rolloffs observed to be in storage. Soil and construction debris (hazardous waste codes F001, F002, F005, D006, D007, D008) from construction projects are stored in the Rolloff Staging Area Less-Than-90-Day Storage Area (AOC 2E).
18	2F	Less-Than-90-Day Hazardous Waste Storage Areas-Experimental Test Oil House	The Experimental Test Oil House Less-Than-90-Day Storage Area (AOC 2F) is located in a small locked building with a concrete base. Drums of waste oils and solvents are managed in the Experimental Test Oil House Less-Than-90-Day Storage Area (AOC 2F).
19	3	Reclamation Area	The solvent Reclamation Area was located inside the main factory building. The unit was used for the distillation of spent solvents generated primarily from degreasing operations on-site. Off-site wastes were also brought to the unit for distillation. The hazardous wastes were primarily received in portable Transporter Tanks (AOC 5G), but occasionally in 55-gallon drums. The wastes were either transferred into one of the still feed tanks or piped directly to one of the distillation units. The reclaimed solvent went to a receiving tank from where it was pumped to bulk storage tanks. There were a total of six 800-gallon capacity blending/reclamation aboveground tanks. There was also an aboveground 1,700-gallon waste 1,1,1-trichloroethane tank and an aboveground 700-gallon waste perchloroethylene tank. The solvent recovery systems and associated waste storage tanks are still located in the Reclamation Area, although the recovery systems and storage tanks have been out of service since May 4, 1992. Perchloroethylene and 1,1,1-trichloroethane were distilled in the Reclamation Area. Still bottoms were generated during the reclamation process. The bottoms were removed from the stills and placed in 55-gallon drums which were labeled and transferred to the Concentrated Waste Treatment Plant (AOC 5) for storage.

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EU ID	AOC ID	Name	Description
20	4	Centralized Waste Storage and Transfer Facility	The Centralized Waste Storage and Transfer Facility was constructed in the immediate vicinity of the Concentrated Waste Treatment Plant (AOC 5). The unit provides for the storage and handling of wastes in containers and tanks within a fully enclosed building encompassing approximately 50,000 square feet. The building houses a total of sixteen (16) 6,000-gallon aboveground storage tanks; 20 container storage areas with segregated bays for separation of incompatibles; 10 staging areas; 4 container unloading stations; 4 truck pads; a forklift ramp; a variety of support equipment; computerized controls; and a control room. Wastes are received from box trailers, drums or Transporter Tanks (AOC 5G). Loading and unloading takes place within fully contained areas with segregated piping to each specific storage/treatment tank. Each pump has the capability to pump from a tanker truck, a Transporter Tank (AOC 5G), or a drum. After storage in the Centralized Waste Storage and Transfer Facility, the waste is subsequently pumped either to the Concentrated Waste Treatment Plant (AOC 5) or sent to an off-site vendor by tanker truck. The AOC is currently operational. The unit provides for the management of five groups of compatible waste in tanks and nine groups of compatible waste in containers. The waste types stored in the container storage areas include: Acid and Chrome Solid/Waste, Acid and Chrome Liquid, Alkali Liquid Alkali and Cyanide Liquid, Cyanide Solid, PCB, Oil/Solvent Paint, TC Solid, Non-Hazardous Zyglo, Alkali, Flammable Paint Solid, and Organic Solid. The types of wastes stored in the 16 aboveground 6,000-gallon capacity tanks include: Acids/Oxidizer, Hydrofluoric Acid, Acids/Mineral, Organic Acids, Fixers, Chromium Solutions, Alkali Treatable, Alkali DWW, Alkali Ammonia, Cyanides, Zyglo & Compatibles, Water/Solvent, Soluble Oils, Treated Soluble Oil, B1 Oil Tank, B3 Oil/solvents, and PCB Oils

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EU ID	AOC ID	Name	Description
21	5A	Concentrated Waste Treatment Plant-Concentrated Waste Treatment Building (CWTP-1)	The Concentrated Waste Treatment Building (CWTP-1; AOC 5A) houses six aboveground batch type pre-treatment tanks. The unit contents of treatment tanks and a waste oil storage tank. The unit also managed a storage pad for storing containers of oxidizer waste, but the pad is no longer in use. There are currently two 2,000-gallon treatment tanks for acid/alkali waste, two 2,000-gallon treatment tanks for chromic acid, and two 12,000-gallon treatment tanks for water soluble waste oil and coolants. Treated waste and wastewater from the batch treatment tanks discharge into the Colt Street treatment facility for final treatment. Approximately 12,000 gallons of waste oil are treated daily with a mixture of calcium chloride and ferrous sulfate to accomplish phase separation. The waste oil managed at the Concentrated Waste Treatment Building (CWTP-1) is pumped to the 1,250-gallon Waste Oil Storage Tank for high flash oils located outside the building, or to the Tank Farm USTs (CWTP-3) prior to off-site disposal. Water phases are discharged to the Colt Street wastewater treatment facility. The spent oils that contain less than 1,000 ppm of total halogenated organics are treated as non-hazardous and are recycled or burned for energy recovery off-site. The remaining oils containing greater than 1,000 ppm total halogens are treated and hauled off-site for disposal as hazardous wastes by a licensed hazardous waste vendor. Waste kolene salts and waste acids were managed at the storage pad outside of the Concentrated Waste Treatment Building (CWTP-1) (AOC 5A).

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EU ID	AOC ID	Name	Description
22	5B	Concentrated Waste Treatment Plant- Barrel Building/Container and Tank Storage Area (CWTP-2)	The Barrel Building/Container and Tank Storage Area (CWTP-2) is a metal building measuring 60 feet long by 60 feet wide. AOC 5B consists of eight waste storage tanks and a transporter storage pad. It has three walls, a roof, and a solid concrete floor with epoxy-coated secondary containment. The building is located southeast of the Concentrated Waste Treatment Building (CWTP-1). The entire unit has been out of service since July 1993. Dry, solid, and liquid wastes were stored in 55-gallon drums, 20-gallon fiber drums, and 275-gallon portable tubs in the unit. One thousand 55-gallon drums could be stored in the unit, with four drums to a pallet and stacked three pallets high. The unit was used as a pumping area where waste oils and solvents were pumped into their appropriate storage tank via a waste-specific portable Transporter Tank (AOC 5G). Compatible material was put into open tanks with containment, prior to batch treatment with concentrated solutions. The eight aboveground waste storage tanks included two waste cyanide tanks, two mixed waste acid tanks, one concentrated chrome tank, one mixed alkali tank, one waste oil/solvent tank, and one waste Zyglo tank. All had an approximately 4,000-gallon capacity. A Transporter Storage Pad outside the Barrel Building/Container and Tank Storage Area (CWTP-2) was used for storage of the portable waste Transporter Tanks (AOC 5G). It measured 58 feet long by 16 feet wide, was equipped with a solid concrete floor and a roof, and was divided into three compartments. The unit held a maximum of 30 Transporter Tanks. The Transporter Tanks were used to move large quantities of wastes from the process areas to the waste storage areas. The following wastes were stored in the Barrel Building/Container and Tank Storage Area (CWTP-2) (AOC 5B): Chemical Products (resins, epoxies, chemical coatings, cleaners, lubricants, absorbents, and polymers), Laboratory Chemicals (acids, alkalies, salts, solvents, organics, inorganics), Alkali and Cyanide Wastes, Waste Paints and Paint Solvents, Kolene Salts (sodium and potassium salts), Waste-Wax/Chlorinated Solvents, Acid Chrome and Carbon Wastes, Waste Aluminum Oxide Powders, Oil Waste, and Waste Solid Sulfur.

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EU ID	AOC ID	Name	Description
23	5C	Concentrated Waste Treatment Plant-Tank Farm USTs (CWTP-3)	The Tank Farm (CWTP-3) consists of three 10,000-gallon capacity, double walled underground storage tanks (USTs). The tanks were installed in 1988. The USTs store hazardous waste for less-than-90 days. At the time of a February/March 1994 CTDEP Inspection, only one of the USTs was in use. The other two were taken out of service in June 1993. Hydraulic, cutting and lubricating oils that are used in various machining operations, which may be contaminated with organic solvents, were managed in the Tank Farm USTs (CWTP-3) (AOC 5C).
24	5D	Concentrated Waste Treatment Plant-Drum/Transporter Storage Pad (CWTP-4)	The Drum/Transporter Storage Pad (CWTP-4) stored hazardous wastes for greater-than-90-days. It is no longer being used. It was located adjacent to the east side of the Concentrated Waste Treatment Building (CWTP-1) (AOC 5A), measured 24.5 feet long by 18.5 feet wide, and was equipped with a solid concrete floor and a roof. The unit could hold a maximum of 100 drums (55-gallon) stored on pallets or 16 Transporter Tanks (AOC 5G) (375-gallon each) , or a combination of each, not to exceed 6,000 gallons. Waste alkalis, waste acids, waste X-ray fixers, and PCB-containing materials were stored in the Drum/Transporter Storage Pad (CWTP-4) (AOC 5D).
25	5E	Concentrated Waste Treatment Plant-Waste Storage Building (CWTP-5)	The Waste Storage Building (CWTP-5) was located east of the Concentrated Waste Treatment Building (CWTP-1), on the opposite side of the airport. Fifty-five-gallon drums as well as smaller containers were stored in the unit. There were also two aboveground 3,600-gallon PCB Waste Oil Storage Tanks (AOC 5E) at the building. The unit was used for cleaning of various materials; weighing and marking of containers; storage of new chemicals; storage of hazardous wastes in containers; repair of equipment or containers; storage of new containers; lab pack preparation; and PCB storage. The unit consists of a pre-engineered, weather tight, heated metal building with a concrete floor slab. The Waste Storage Building (CWTP-5) (AOC 5E) manages various types of machine oils, as well as electrical waste oils containing PCBs in excess of 50 ppm. The unit primarily stores PCB waste and waste powders from the Plasma Spray Booths (AOC 12). Waste oil containing PCBs is stored in the two aboveground PCB Waste Oil Storage Tanks. Waste powders are shipped off-site for nickel recovery.

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EU ID	AOC ID	Name	Description
26	5F	Concentrated Waste Treatment Plant- Hazardous Waste Storage Building (CWTP-6)	The Hazardous Waste Storage Building (CWTP-6) stores hazardous wastes in containers or Transporter Tanks (AOC 5G) on pallets for less-than-90-days. The unit consists of a pre-engineered, weather tight, heated metal building with a concrete floor slab. The Hazardous Waste Storage Building (CWTP-6) (AOC 5F) manages non-hazardous waste oil debris; hazardous waste flammable liquid; waste solvents; hazardous waste corrosive liquid; lab packs containing aerosol cans (D001, U121, U210, U228); batteries (D002, D006, D007, D008); and mercury wastes (D009, U151).
27	5G	Concentrated Waste Treatment Plant-Transporter Tanks	The Transporter Tanks were used to move large quantities of wastes from the process areas to the waste storage areas. The acid Transporter Tanks were lined with acid resistant materials such as hypalon, whereas the alkali and cyanide Transporter Tanks were unlined. At the edge of the Barrel Building/Container and Tank Storage Area (AOC 5B), there were unloading platforms, each specifically allocated for either the acid, alkali, or cyanide Transporter Tanks. When the Transporter Tanks were in place, the discharge valve was opened and the waste flowed to the appropriate Storage Tank. Acid, alkali, cyanide, and chrome wastes from plating fluids or degreasing solvents are stored in Transporter Tanks (AOC 5G) at the Transporter Storage Pad (AOC 5B).
28	6	Dilute Wastewater Pre-Treatment Plant	The Dilute Wastewater Pre-Treatment Plant is located at the Concentrated Waste Treatment Building (CWTP-1) (AOC 5). Wastes are managed in either a chromium tank for chromium reduction, a cyanide tank for cyanide destruction, or a wet well for pH adjustment. Following the pre-treatment, all effluent is piped approximately one-half mile to a final treatment system at the Pratt & Whitney Colt Street facility wastewater treatment system. The AOC is currently operational. The unit receives dilute rinsewaters and contact cooling waters from cleaning, polishing, electroplating, and vapor blast lines. It also receives scrubber waters, including waste caustic/alkali rinsewaters; dilute cyanide waste streams; dilute hexavalent chrome wastewaters; and oily waters from the Soluble Oil Collection Sumps (AOC 7).

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EU ID	AOC ID	Name	Description
29	7	Soluble Oil Collection Sumps	Spent soluble oil is removed from metal machining equipment and placed into one of the two Soluble Oil Collection sumps. The contents of the sumps are pumped to the Dilute Wastewater Pre-Treatment Plant (AOC 6) at the Concentrated Waste Treatment Building (CWTP-1) (AOC 5A). From here, the wastewaters are transferred to the Colt Street wastewater treatment facility, where the oil is skimmed and collected for vendor fuel blending or incineration. The sumps are each estimated to have a capacity of 100 gallons. The contents of the sumps are automatically pumped out when the sump reaches a certain level. One sump is located at the lower end of Willow Brook Pond and the other is located at Skimmer Shack, just below the cooling water discharge.
30	8	Concentrated Waste Sludge Impoundments	There were six Concentrated Waste Sludge Impoundments, each measuring 55 feet long by 70 feet wide at the Pratt & Whitney Aircraft Main Street facility. The unlined units were used for partial dewatering and temporary storage of sludges generated at the Concentrated Waste Treatment Plant (AOC 5). All waste was removed from the impoundments, processed through the Pratt & Whitney Colt Street treatment facility and disposed of in a permitted landfill in 1976. The units have been paved over. The impoundments received wastewater treatment sludges from neutralization of spent plating baths, cyanide destruction, reduction of hexavalent chromium, and soluble oil treatment. The total quantity of waste handled is unknown.

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EU ID	AOC ID	Name	Description
31	9	Storm Drainage System	The Storm Drainage System discharges into Willow Brook. Catch basins located throughout the facility connect to the unit. Roof drainage from the Waste Storage Building (CWTP-5) and the Hazardous Waste Storage Building (CWTP-6) is piped directly into a catch basin connected to the Storm Drainage System. Catch basins are also located east of the Concentrated Waste Treatment Building (CWTP-1), south of the Barrel Building/Container and Tank Storage Area (CWTP-2) and northwest of the Tank Farm (CWTP-3. A new Storm Drain was recently constructed around the north, west and south sides of the new Centralized Waste Storage and Transfer Facility (AOC 4). The AOC is currently operational. Approximately 700 gallons of nitric/hydrofluyoric acid were spilled into the Storm Drainage System leading to Willow Brook Pond when a process tank was ruptured in an accident. The spill occurred on September 19, 1979. Approximately 200 to 300 gallons of Jet A fuel were spilled into the storm drain leading to Willow Brook when a pipe fitting a fuel line ruptured. The spill occurred on June 7, 1980. Approximately 300 gallons of Jet A fuel were spilled into the storm drain when a fuel system originating in the North Tank Farm (AOC 10B) was inadvertently over-pressurized causing an overflow of the vent pipes. The spill occurred on December 6, 1980. [Approximately 30 gallons of sodium cyanide were spilled into the storm drain when a 55-gallon drum was pierced with a fork lift. The spill occurred on October 15, 1981.] [Approximately 30 gallons of sodium cyanide were spilled into the storm drain when a 55-gallon drum was pierced with a fork life. The spill occurred on October 15, 1981.] Approximately 160 gallons of ferric sulfate/hydrofluoric acid spilled into the storm drain when a discharge valve of a 375-gallon portable acid Transporter Tank (AOC 5G) was left partially open. The spill occurred on .October 4, 1982. Approximately 220 gallons of Jet A fuel flowed in two floor drains in the X Test Oil House (AOC 2C) when the fuel pump seal for a burner rig leaked on April 10, 1991. The floor drains discharged to an ejector pit where water is normally collected from the Engine and Experimental Testing Facility. A small quantity of the fuel may have been pumped to Willow Brook Pond.

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EU ID	AOC ID	Name	Description
32	10A	Tank Farms-North Tank Farm	The .North Tank Farm (AOC 10A) was the main product storage area at the facility. It consisted of 36 USTs ranging in size from 2,500 to 20,000 gallons. Only six abandoned tanks remain. The North Tank Farm (AOC 10A) contained perchloroethylene; 1,1,1-trichloroethane; varsol; hydraulic oil; broaching oil; and other fluids. Thirty USTs were removed and six were abandoned-in-place at the North Tank Farm (AOC 10A). Approximately 200 cubic-yards of soil were excavated and disposed of at the Town of East Hartford Landfill with the approval of CTDEP. Approximately 700 cubic-yards of soil was removed and disposed of off-site as hazardous waste. Five groundwater monitoring wells were installed in the area.
33	10B	Tank Farms-South Tank Farm	The South Tank Farm (AOC 10B) is located adjacent to the Former Oil House (AOC 3). It consisted of twelve USTs. The salvage fuel tanks in the South Tank Farm (AOC 10B) stored waste jet fuels and solvents. Ten USTs were removed and two were abandoned-in-place at the South Tank Farm (AOC 10B). Approximately 700-cubic-yards of contaminated soil were excavated and disposed of at the Town of East Hartford Landfill with the approval of CTDEP. Six groundwater monitoring wells were installed.
34	10C	Tank Farms-Rentschler Field Tank Farm	The Rentschler Tank Farm (AOC 10C) consisted of ten USTs. No waste management information was available in the file material on the Rentschler Tank Farm (AOC 10C) . Soil and groundwater became contaminated with hydrocarbons during the UST removal program at Rentschler Field Tank Farm (AOC 10C) in late 1985. Ten truckloads of contaminated soils were removed by Rollins Environmental Services and shipped to Louisiana for disposal by April 1, 1986. According to the available file material, an additional five to eight truckloads were expected to be necessary to complete the removal of contaminated soils. Another reference indicated that 150 cubic-yards of soil were removed and disposed of in Louisiana by Rollins Environmental Services.

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35	10D	Tank Farms-Power House Tank Farm	The Power House Tank Farm (AOC 10D) consisted of seven tanks ranging in size from 5,000 to 20,000 gallons. Two of the Power House Tank Farm (AOC 10D) USTs managed waste oils in the late 1970's. The remaining tanks stored No. 6 fuel oil. Seven USTs were removed from the Power House Tank Farm (AOC 10D). Approximately 500-cubic-yards of soil contaminated with waste oils, unleaded fuel, and diesel fuel were excavated from the Power House Tank Farm. The soils were disposed of at the Town of East Hartford Landfill with thc approval of CTDEP. Four groundwater monitoring wells were installed.
36	10E	Tank Farms-Experimental Test Tank Farm	The Experimental Garage Tank Farm (AOC 10E) consisted of four USTs. No waste management information was available in the file material on the Experimental Garage Tank Farm (AOC 10E). Three USTs were removed and one was abandoned-in-place at the Experimental Test Tank Farm (AOC 10E). Approximately 350 cubic-yards of contaminated soil were excavated and disposed of at the Town of East Hartford Landfill with the approval of CTDEP. Four groundwater monitoring wells were installed.
37	10F	Tank Farms-Executive Garage Tank Farm	The Executive Garage Tank Farm (AOC 10F) consisted of two 4,000-gallon USTs used to store unleaded fuel and diesel fuel. Two USTs were removed from the Executive Garage Tank Farm (AOC 10F). Approximately 70 cubic-yards of soil contaminated with waste oils, unleaded fuel, and diesel fuel were excavated from the Executive Garage Tank farm. The soils were disposed of at the Town of East Hartford Landfill with the approval of CTDEP. Two groundwater monitoring wells were installed.
38	10G	Tank Farms-Main Oil House Tank Farm	The Main Oil house Tank Farm (AOC 10G) contains 14 USTs. The Main Oil House Tank Farm (AOC 10G) primarily stores oils, fuels, and solvents. Two 10,000-gallon tanks stored salvage jet fuel, which was collected for off-site disposal.

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39		Tank Farms-X-312 Tank Farm	A former tank farm which was a fuel distribution system for test stands immediately north and to the south in the South Klondike. The five tanks comprising the tank farm were located in the southwestern corner of the North Klondike. There were three 3,000-gallon and two 5,000-gallon underground steel storage tanks. Jet fuels "A" and JP-5 were supplied to the nearby test stands; other jet fuels such as JP-4, JP-5, and isooctane may have been used at the test stands also.
40	11	Contaminated Soil Piles, Contractor Area	This unit consists of one large unpaved lot. In the large unpaved lot, debris and contaminated soil from an UST removal was placed in seven piles for a short term in an area of approximately 40 feet by 120 feet. An EPA Region 1 inspection revealed that one of the piles was clean fill, another was concrete and non-contaminated construction debris, a third pile contained excavated clean soil, a forth pile contained 10 cubic yards of "probably clean" soil, a fifth pile contained jet fuel contaminated soil, a sixth pile contained 400 cubic yards of PCE and fuel contaminated soil, and a seventh pile contained 250 cubic yards of solvent (PCE, 1,1,1-TCA, 1,2-DCE, and 1,2,3-trimethyl benzene) contaminated soil. The piles were covered in plastic and surrounded by soil berms.
41	12	Plasma Spray Booths	There are eighteen wet scrubber Plasma Spray Booths. Waste powders generated at the units are stored in the Waste Storage Building (CWTP-5) (AOC 5E). The non-hazardous scrubber metal powders from the plasma spray machines are subsequently sent to the East Hartford Landfill. The Plasma Spray Booths are currently operational. Wastes generated from the operation of the Plasma Spray Booths resulted from the use of the following metal powders: Tungsten-Cobalt blend, Nickel-Chromium blend, Aluminum Oxide-silicon Dioxide blend, Cobalt-Chromium-Tungsten blend, Cobalt-Chromium-Nickel-Tungsten bland, Magnesium Oxide-Zirconium Oxide blend, Aluminum Oxide-Titanium-Silicon dioxide blend, Chromium alloy, Cobalt alloy, Copper-Nickel blend, Nickel-Aluminum blend, and Molybdenum

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42	13	Dust Collectors	There are a total of 54 Dust Collectors at the facility: Eighteen Dust Collectors serve operations that grind, deburr or finish high-speed steel components, including both tools and engine parts. Eleven Dust Collectors serve grit blast operations which use aluminum oxide or steel shot powders to induce a finish on a variety of engine components. Four Dust Collectors serve operations that grind, deburr and finish steel and nickel alloy engine components. One Dust Collector serves an operation that cuts commercial grade plywood. Fourteen Dust Collectors serve operations that grind, deburr and finish steel and titanium alloy components. Six Dust Collectors serve operations that grind, deburr and finish steel/nickel/titanium alloy components. The non-hazardous dust waste from machining operations is sent to the East Hartford Landfill. The Dust Collectors are currently operational. Industrial wastes consisting of aluminum oxide; silicon carbide; steel shot powders; steel and nickel alloy; and steel and titanium alloy are managed in the Dust Collectors. No solvents, cyanides or sulfides are used in any of the processes served by any of the fifty-four Dust Collectors in the facility.
43	14	Trash Incinerators	There are three Trash Incinerators on-site. The maximum charging rates for the units range from 450 to 2,300 pounds per hour. The units are currently operational. The Trash Incinerators burn waste oil and dry refuse waste consisting of 90% paper and 10% scrap metal.
44	15	Waste Wax/Solvent Tank	The Waste Wax/Solvent Tank was located in the Concentrated Waste Treatment Plant (AOC 5) area in the same building as the former liquid injection incinerator. The unit was intended to be used in conjunction with the incinerator and was connected to the incinerator via a feed line. However, the facility decided to close the incinerator. A Closure Plan for the Waste Wax/Solvent Tank was submitted in November 1990. The unit stored wax/Solvent still bottoms from the distillation of spent solvents, such as perchloroethylene and 1,1,1-trichloroethane. The wax/solvent mixture was heated to avoid precipitation.

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EU ID	AOC ID	Name	Description
45	16	Fire Training Area "A", Tie Down Area	Fire Training Area "A" was originally an unlined pit used for fire fighting training exercises. Both virgin fuels and waste flammable liquids, including Jet A fuel, No. 2 fuel oil, and lubricating oils, were burned. When the unlined pit was demolished in 1983, approximately 800-cubic yards of contaminated soil were removed and approved for disposal by the Connecticut DEP at the Town of East Hartford Landfill.
46	17	Former Oil House	The Former Oil House was located inside the main factory building with the Reclamation Area (AOC 3). The unit was adjacent to the South Tank Farm (AOC 10C.). Activities in the Former Oil House included the distribution of oils and solvents; oil blending and drum staging. Various used oils generated at the facility, including blend, hydraulic and cutting oils, were reclaimed at the unit. Blending oil mixtures were made using new and/or reclaimed oils according to Pratt & Whitney specifications. The various reclaimed oils were distributed to the different shops at the facility. If the reclaimed and/or blended oil met certain specifications, it was pumped into 55-gallon drums, labeled, sealed and stored for future use, or it was directed to their respective bulk storage tanks at the South Tank Farm (AOC 10C) next to the Former Oil house. Used oils that were not reclaimable were sent to the Concentrated Waste Treatment Plant (AOC 5) for proper disposal. Tank bottom waste was generated in the reclamation of used oils, including blend, hydraulic and cutting oils. The waste was emptied into 55-gallon drums, was sampled, and sent to the Concentrated Waste Treatment Plant (AOC 5) for proper disposal.
47		Contractor Storage Area, Contractor Area	This unit consists of a series of small paved lots serving as a marshaling area for Pratt & Whitney subcontractors. Many of the areas had trailers located on them. The pavement is in fair condition. The paved Contractor Storage Area was used for storage of contractor equipment and supplies, mostly inside storage sheds or trailers. The supplies used were relatively small quantities of fuels, paints, and cleaning fluids.
48		Storage Area 3, Virgin Products Storage Area	An outside drum storage area was located in the western portion of the Virgin Products Storage Area and consisted of a 200 foot by 300 foot, partially paved area. Drums were stored upright and stacked on their sides. The area was used for storage of virgin and waste products, which likely included solvents, jet fuels, hydraulic and lubricating oils, calibration fluids, cutting oils, methanol, toluene, methylene chloride, acetone, and methyl ethyl ketone. Staining of the pavement was seen on aerial photographs.

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49		Barrel Storage Shed, Virgin Products Storage Area	A small barrel storage shed was located in the northern portion of the Virgin Products Storage Area, south of the Quonset Hut. The shed was probably used for storage of chemicals, but there is no information available.
50		Rubble Piles, X-307 Area	Multiple piles of rubble are located in a line in the southern portion of the X-307 Area. The piles of debris contain concrete block, brick, asphalt, and metal pipe.
51		Septic System, X-307 Area	A septic system consisting of a concrete septic tank and four line leaching field received septic waste from the X-307 Control House. The septic tank is approximately 2,500 gallons in size. The septic tank is scheduled for removal.
52		Firing Range	A firing range was identified on a land surveyor's map of the South Klondike Area. The firing range consisted of a probable firing mound and a kidney-shaped backstop mound. Based on a review of a 1948 a aerial photograph, there was a connecting corridor between the mounds which may have represented a devegetated pathway.
53		B-24 Test Stand, Tie Down Area	A concrete trench and a horizontal exhaust pipe were located on the edge of the concrete Tie Down Area. Jet engines were suspended over the trench for testing, and the exhaust was directed into the pipe which was angled slightly upward toward a wetland area. JP-5 jet fuel and special fuels as required were used for testing.
54		USTs, Tie Down Area	Two underground storage tanks (USTs) were located in the western portion of the Tie Down Area. One UST consisted of a 1,000-gallon steel tank which was used for storing waste flammable material as fuel for the adjacent Fire Training Area "A". The other UST consisted of a 15,000-gallon steel Jet "A" fuel tank. The fuel was probably used for running engines in the Tie Down Area.
55		Fire Training Area "B", South Airport Area	Fire Training Area "B" was an unpaved area which measured 1,500 feet by 300 feet with the actual combustion area much smaller. A pit, 40 feet in circumference, was dug to be filled with water prior to training exercises. Flammable and combustible materials were poured onto the water-filled pit and ignited for fire fighting training exercises.
56		Tank Trailer Storage Area, South Airport Area	Empty box trailers and bulk liquid tank trailers are stored in this area. The bulk liquid tank trailers are used to transport hazardous waste or fuels. Equipment is also stored in this area, including engines in a fenced area, stands for holding engines, and miscellaneous metal equipment.

Table A-1
IDENTIFICATION OF ENVIRONMENTAL UNITS
Main Street Facility
East Hartford, Connecticut

EU ID	AOC ID	Name	Description
57		Septic System, X-314 Area	A septic system consisting of a concrete septic tank and single line leaching field received septic waste from the trailer. The septic tank had been abandoned in place and was filled with a mixture of crushed stone and soil over a thin layer of sludge in the bottom. The septic tank is scheduled for removal.
58		Drum Storage, Virgin Products Storage Area	A small drum storage area was located in the northeast portion of the Virgin Products Storage Area next to the Quonset Hut and consisted of a paved area. The area was used for storage of virgin and waste products, which likely included solvents, jet fuels, hydraulic and lubricating oils, calibration fluids, cutting oils, methanol, toluene, methylene chloride, acetone, and methyl ethyl ketone. Staining of the pavement and nearby soil was seen on aerial photographs.
59		Outside Drum Storage, Virgin Products Storage Area	An outside drum storage area was located in the northeast portion of the Virgin Products Storage Area and consisted of a 32,000 square foot paved area. The area was used for storage of virgin product, which likely included solvents, jet fuels, hydraulic and lubricating oils, calibration fluids, cutting oils, methanol, toluene, methylene chloride, acetone, and methyl ethyl ketone. Staining of the pavement was seen on aerial photographs.
60		Aboveground Storage Tank, Cryogenics Area	A former 300-gallon diesel AGT was located north of the Transformer Room and Pump House. In July 1995, a small leak was noticed in the supply line. The tank and contaminated soil was subsequently removed.
61		Septic System, Cryogenics Area	A septic system consisting of a manhole connected in-line between the building and two concrete septic tanks and a 16-line leaching field received septic waste from the Cryogenics Building. The septic tanks are approximately 1,500 gallons in size. The septic system is located north of the building and is still in place. The septic tanks and manhole are scheduled for removal.
62		Dry Well, Cryogenics Area	A dry well, whose location has not been confirmed, is reportedly located to the northeast of the Cryogenics Building and east of the septic system. The dry well consisted of perforated vitrified pipe which received potential drainage from the floor drains in the test cells and the machine shop in the building. The dry well is scheduled for removal.
63		Septic System, Former Linde Gas/Chemical Storage Area	A septic system consisting of a concrete septic tank and four line leaching field received septic waste from a former building of the Former Linde Gas Plant. The septic tank is approximately 1,000 gallons in size. The septic system is still in place and the septic tank is scheduled for removal.
64		Loading and Unloading Area, Former Linde Gas/Chemical Storage Area	The former loading and unloading area was located on the south side of the Chemical Storage Building. This area was used for loading and unloading chemicals into the building.

X

Table A-1
IDENTIFICATION OF ENVIRONMENTAL UNITS
Main Street Facility
East Hartford, Connecticut

EU ID	AOC ID	Name	Description
65		Fuel Oil UST, Former Linde Gas/Chemical Storage Area	The UST was located beneath both footprint of the Chemical Storage Building and the former loading and unloading area, and consisted of a fuel oil tank of unknown size for a building in the former Linde Gas Area. The fuel oil UST was probably used for heating the former Linde Gas building known as the Reformer Area.
66		Former Linde Gas/Chemical Storage Building, Former Linde Gas/Chemical Storage Area	The former Linde Gas Area was a 90,000 square foot area containing the hydrogen gas plant which was built in 1965 and remained in place until the Chemical Storage Building was erected in approximately the same location in 1981. The Chemical Storage Building was a 100 foot by 160 foot building divided into equal halves. Presently, only the foundation remains of this structure. Hydrogen was manufactured from natural gas in the Former Linde Gas Area. Acids (at a minimum) were stored in the Chemical Storage Building
67		Drum Storage, Former Linde Gas/Chemical Storage Area	Several outdoor storage areas of potential drums were observed on facility aerial photographs from approximately 1977. Two drum storage areas were formerly located north of where the foundation of the Chemical Storage Building is currently located.
68		Dumpster, Former Linde Gas/Chemical Storage Area	An outdoor storage area for a dumpster was observed on facility aerial photographs from approximately 1977. The dumpster was formerly located west of where the foundation of the Chemical Storage Building is currently located.
69		Drain Pipe, X-410 Area	A drain pipe from a building which contained the following units: X-410 Test Stand, X-411 Test Stand, X-411 Compressor Room, X-411 Control Room, and X-412 Test Stand. The drain pipe discharged to a drainage swale to the south. The X-410 Test Stand was a 14 foot by 8 foot open-ended room with a floor drain. The X-411 Test Stand was a 14 foot by 25 foot room. The X-411 Compressor Room was a 20 foot by 23 foot room with two floor drains, which possibly discharged to the drainage swale to the south. The X-411 Control Room was a 13 foot by 29 foot room. The X-412 Test Stand was a 19 foot by 21 foot room. Presently, only the foundation of the building remains. The drain pipe could have received materials from floor drains in the building. The X-410 Test Stand and the X-411 Control Room were used for testing of jet engines. The X-411 Test Stand was used as a testing facility for small combustion components such as gas turbine main burners. The X-411 Compressor Room supplied compressed air to the test stands. The X-412 Test Stand was a fire safety standards test facility for investigating fire resistance of fuel control and gearbox components.

Table A-1
IDENTIFICATION OF ENVIRONMENTAL UNITS
Main Street Facility
East Hartford, Connecticut

EU ID	AOC ID	Name	Description
70		Maintenance & Storage Septic System, X-410 Area	A septic system consisting of a circular septic tank of approximately 8 feet in diameter and 5 feet deep (1,500 gallons in size) and a leaching field received domestic sewage from the Storage and Maintenance Building. The septic system still exists and the tank is scheduled for removal. The Storage and Maintenance Building which was a 15 foot by 25 foot structure with a slab-on-grade foundation. Presently, only the foundation of this building remains.
71		Chemical Storage Building, Explosives Storage Area	The Chemical Storage Building was a 6 foot by 8.5 foot building surrounded by a 20 foot by 24 foot chain-link fence. The building was used for storage of acids, bases, and cleaning solvents.
72		Outside Chemical Storage Shed, Explosives Storage Area	The Outside Chemical Storage Shed was surrounded by a 20 foot by 25 foot chain link fence; the exact dimensions of the shed are unknown. The shed was used for storage of acids, bases, and cleaning
73		Explosives Storage Building, Explosives Storage Area	The Explosives Storage Building was 10.5 foot by 20.5 foot in dimension and was surrounded by a 25 foot by 50 foot chain link fence. The building was used for storage of hydrazine, pentaborane (both explosive liquids)
74		Fill Area, Explosives Storage Area	Filling with possible materials from around the Klondike Area occurred. The exact dimensions of the fill area are unavailable.
75		Underground Storage Tank, Explosives Storage Area	A former 500-gallon underground fuel oil tank was located west of the Explosives Storage Building. It supplied fuel oil for heating the building.
76		Steel Tank, X-430 Area	A partially exposed stainless steel tank exists on the west side of the former building which housed Test Cells X-430 through X-436 (M&E, 1993). Presently, only the foundation of the building remains. The former use of the tank is unknown.
77		Dry Well, X-415 Area	A dry well, whose location could not be confirmed, is reportedly located to the southeast of the septic system. The dry well received potential drainage from two floor drains in Test Cell X-416 and floor drains in Test Cell X-417 (M&E, 1993). This dry well may have been removed when a drainage ditch was installed, and the floor drains may have been piped to the ditch at that time.
78		Septic System, X-415 Area	A septic system consisting of a circular concrete septic tank of approximately 1,000 gallons in size and a leaching field received septic waste from the Combustion Laboratory. The septic system still exists. The septic tank is scheduled for removal.

Table A-1
IDENTIFICATION OF ENVIRONMENTAL UNITS
Main Street Facility
East Hartford, Connecticut

EU ID	AOC ID	Name	Description
79		Boiler Room AGT, X-415 Area	A former 5,000-gallon No. 2 or 4 fuel oil AGT; which was located on three concrete saddles, supplied fuel oil to the boiler. Presently, only the concrete saddles remain.
80		Dry Wells, X-401 Area	Three dry wells are each comprised of a 55-gallon drum with the bottom removed. The drum was placed upright in the ground with the top even with the ground surface. The interior of the drums were empty except for a layer of 2- to 3-inch traprock laid in the bottom to aid infiltration. A "drip tray", which was apparently used for collecting unburned fuel from testing, was located in the dry well northeast of the Equipment Shed. This dry well was located inside of a small fenced area. Liquid was poured into the dry wells and allowed to infiltrate.
81		Soil Piles, Undeveloped Land	Two soil piles containing debris and construction materials (e.g., reinforced concrete pipes) are located in an area that measures approximately 100 feet by 200 feet.
82		Fire Training Area "C", X-401 Area	Fire Training Area "C" was an unpaved oval-shaped depression in an area which measured approximately 100 feet by 100 feet. Flammable and combustible materials such as waste oils, Jet A, JP-4, and JP-5 fuels may have been poured into the depression and ignited for fire-fighting training exercises.
83		Locker Room Septic System, X-401 Area	A septic system consisting of a steel septic tank of approximately 2,000 to 3,000 gallons in size and a ceramic-tile leaching field (M&E, 1993) received domestic sewage from the Locker Room. The septic system still exists. The septic tank is scheduled for removal.
84		Fire Training Area "D", MERL	Fire Training Area "D" was an open area to the north of the Control Room. A circular pit was reported to be dug to be filled with water prior to training exercises. No evidence of the pit was observed in 1996 by LEA, and the exact location is unknown. Flammable and combustible materials were poured onto the water-filled pit and ignited for fire fighting training exercises.
85		Former Army Barracks Septic Systems	The Rentschler Field Former Army Barracks extended from the northern end of runway 18 westward into the present UTRC Area. There were approximately 33 buildings with a typical size of 20 feet by 100 feet. The former army barracks were used as temporary quarters for military personnel. Sixteen septic systems of various size were installed to handle the sanitary wastewater. Several of the septic systems were located on UTRC property.
86		USTs, Former Pickle Company Factory	Three former underground storage tanks of unknown size were located adjacent to former buildings of the Former Pickle Company Factory. Two of these tanks were apparent fuel oil tanks. The third tank was an apparent gasoline tank located next to a former dispenser pump. No evidence of the tanks or the pump island remain.

Table A-1
IDENTIFICATION OF ENVIRONMENTAL UNITS
Main Street Facility
East Hartford, Connecticut

EU ID	AOC ID	Name	Description
87		UST, Cryogenics Area	A former 1,000-gallon underground fuel oil tank was located south of the Cryogenics Building. It supplied fuel oil for heating the building. The tank was removed (M&E, 1993).
88		PCB Storage Area, X-407 Area	The X-407 Area includes a building which contained the following units: the PCB Storage Area (formerly the X-404 Test Stand, X-405 Test Stand, X-406 Test Stand, and X-407 Test Stand); a building which contained X-408 Test Stand; a building which contained X-408 Test Rig Room; a building which contained X-409 Test Stand; the Compressor Building; the North Klondike Pump House; and a shed. The X-404 through X-409 Test Stands and the X-408 Test Rig Room were used for testing of jet engines. The Compressor Building was used to generate pressurized air for the testing of engines. The PCB Storage Area was used for storing PCB-contaminated materials. The North Klondike Pump House was a booster pump location for water supply. The use of the shed is not known. The building which contained the former PCB Storage Area was enclosed in a chain-link fence and bermed pavement. Presently, only the foundation remains for all of these buildings.

FIGURES

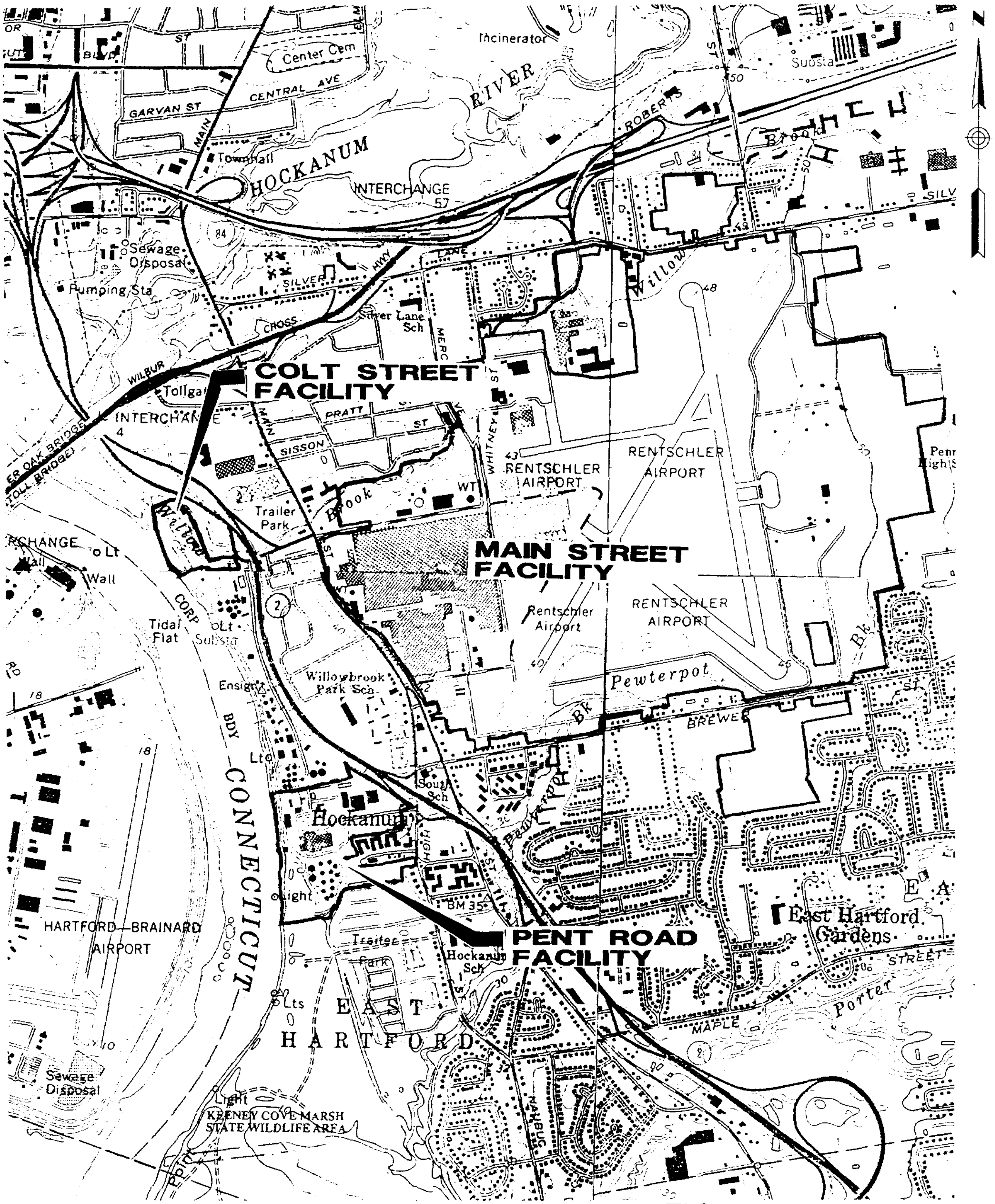


FIG. A-1

MAP REFERENCE:
USGS 7.5 MINUTE SERIES QUADRANGLES FOR HARTFORD NORTH, HARTFORD SOUTH, GLASTONBURY, AND MANCHESTER CONN., DATED 1964 & 1963 AND REVISED 1992.

1000 0 1000 2000 3000

SCALE IN FEET

VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY MAIN STREET FACILITY

USGS TOPOGRAPHIC MAP

Comm.No. 68VC601	Pratt & Whitney A United Technologies Company / LEA

VEH-FIGS (1)

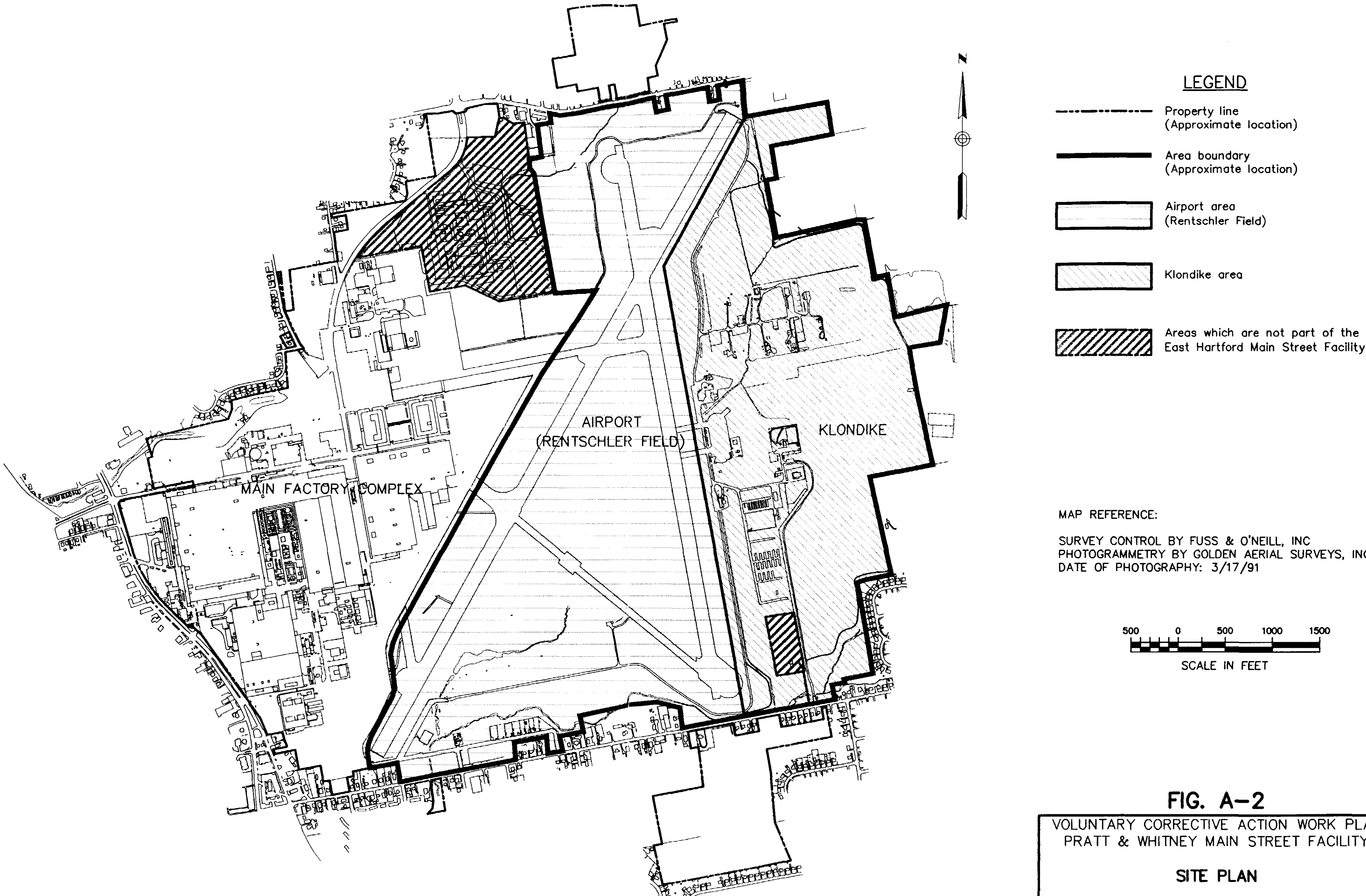


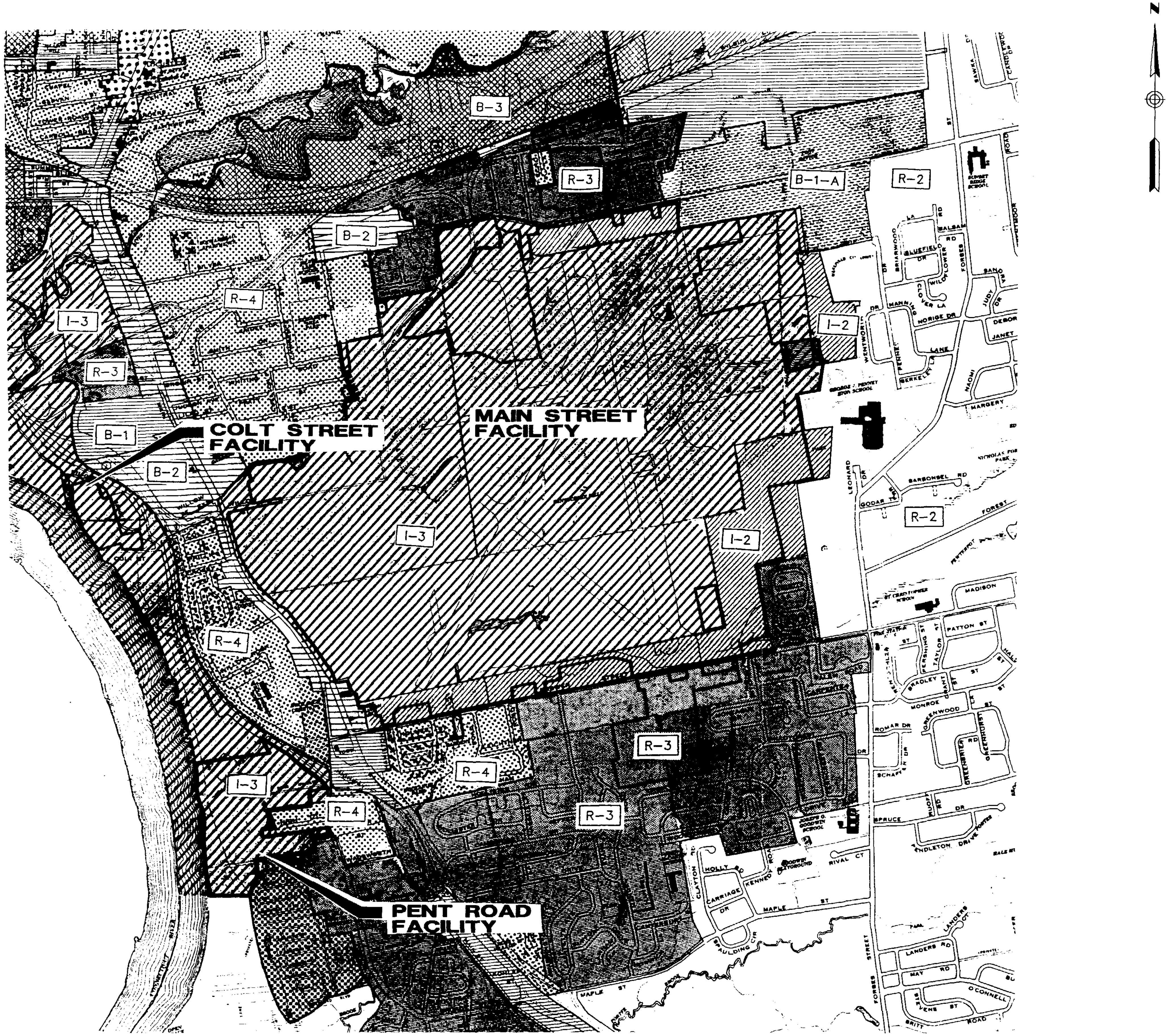
FIG. A-2

VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY MAIN STREET FACILITY

SITE PLAN

Comm.No. 68VC601	Pratt & Whitney A United Technologies Company / LEA

VEH-FIG2 (1030)



LEGEND

- Residence 2 (R-2)
- Residence 3 (R-3)
- Residence 4 (R-4)
- Residence 6 (R-6)
- Business 1-A (B-1-A)
- Business 1 (B-1)
- Business 2 (B-2)
- Business 3 (B-3)
- Business 4 (B-4)
- Business 5 (B-5)
- Industry 1 (I-1)
- Industry 2 (I-2)
- Industry 3 (I-3)

MAP REFERENCE:
ZONING MAP OF THE TOWN OF EAST HARTFORD
ADOPTED AUGUST 1, 1981.
LAST REVISION DATE: FEBRUARY 29, 1996

800 0 800 1600 2400
SCALE IN FEET

FIG. A-3

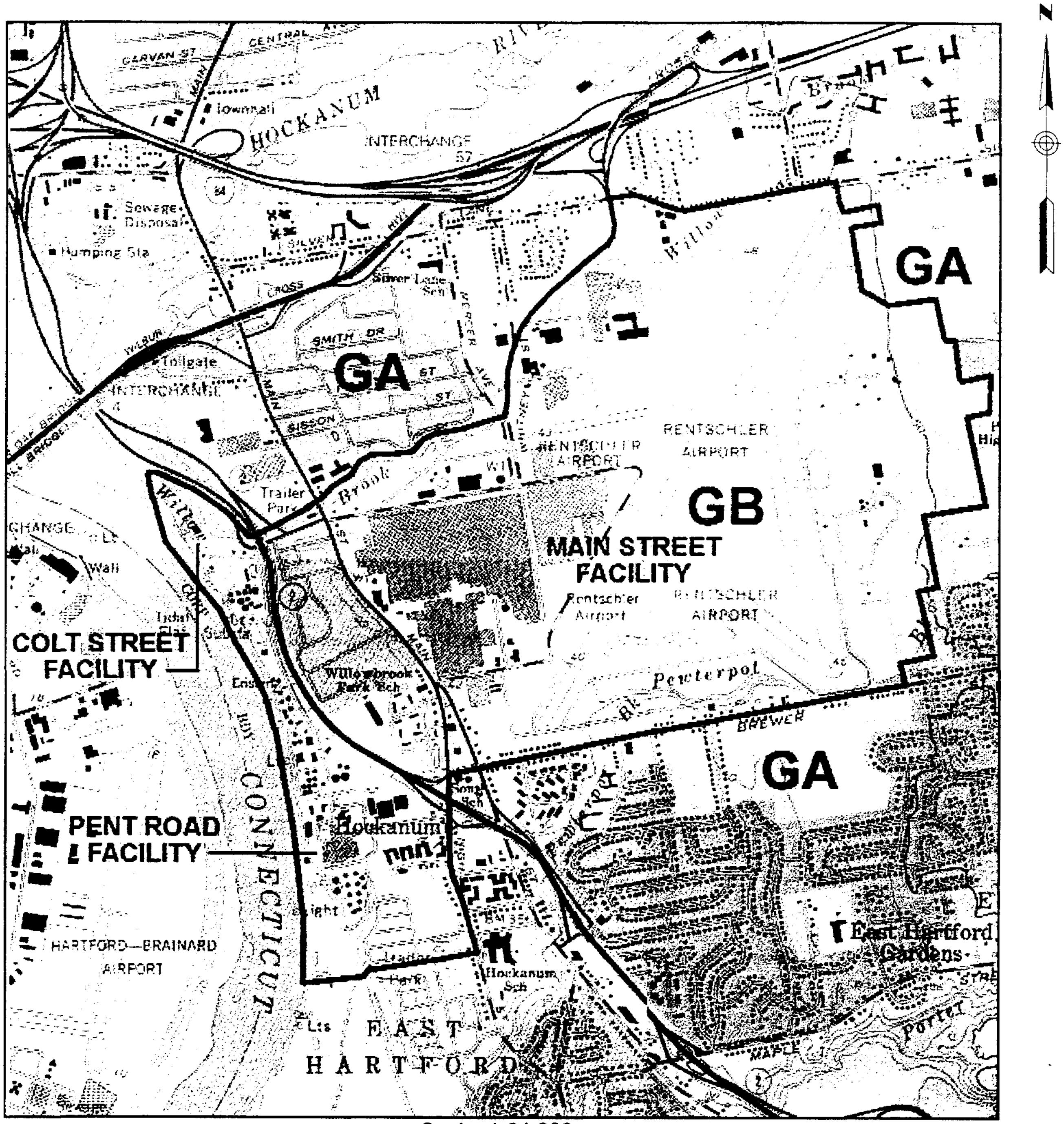
VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY MAIN STREET FACILITY

ZONING MAP

Comm.No. 68VC601

Pratt & Whitney A United Technologies Company / LEA

VEH-FIGS (1)



Scale: 1:24,000

1000 0 1000 2000 3000

SCALE IN FEET

NOTES:
Groundwater classifications from "ADOPTED WATER QUALITY CLASSIFICATIONS FOR THE CONNECTICUT RIVER BASIN: CTDEP, JUNE, 1988. Modified per groundwater classification, JUNE, 1996.

MAP REFERENCE:
USGS 7.5 MINUTE SERIES QUADRANGLES FOR HARTFORD NORTH, HARTFORD SOUTH, GLASTONBURY, AND MANCHESTER CONN., DATED 1964 & 1963 AND REVISED 1992.

FIG. A-4

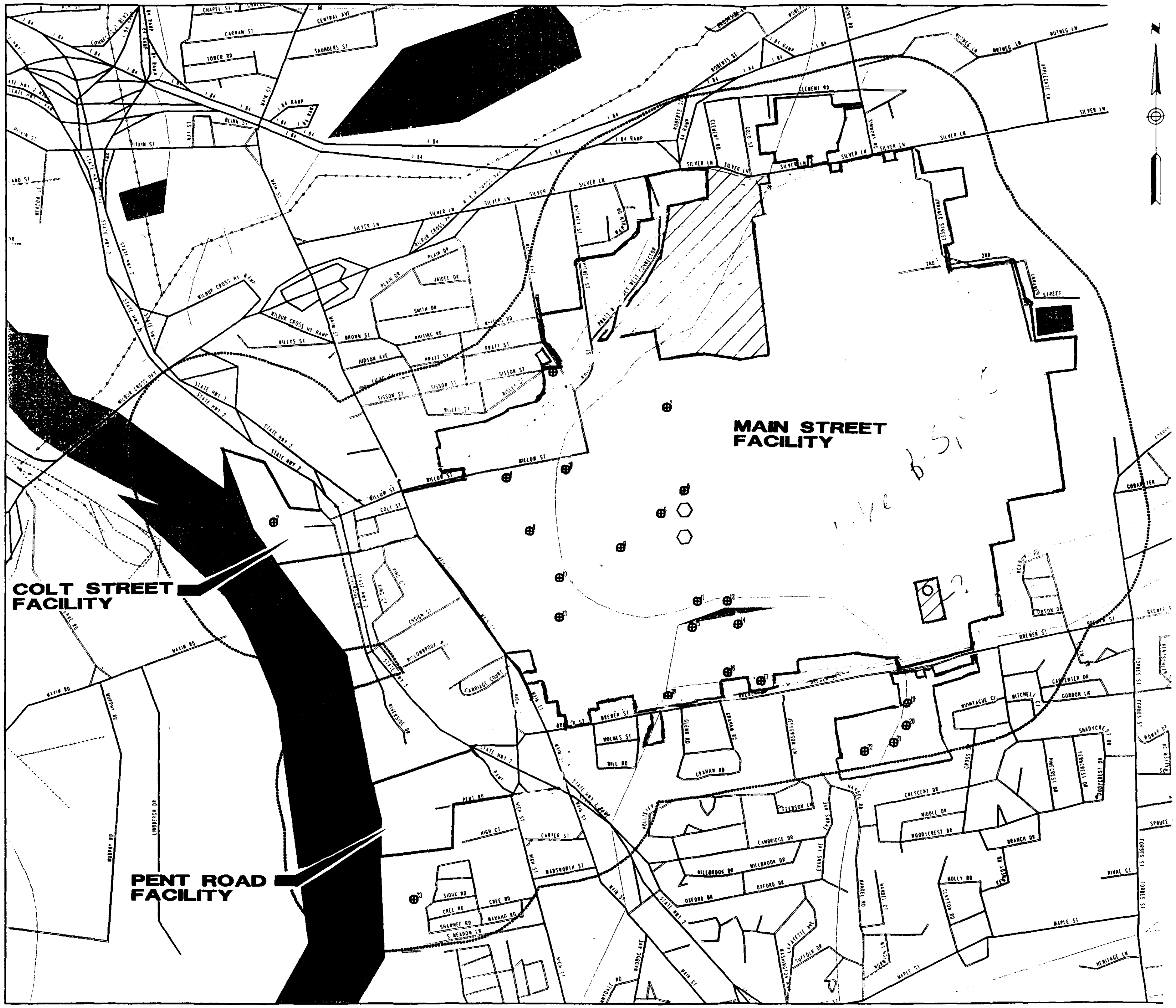
VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY MAIN STREET FACILITY

GROUNDWATER CLASSIFICATIONS

Comm.No. 68VC601

Pratt & Whitney A United Technologies Company / LEA

VEH FIGS (1)



LEGEND

Well identified by EDR's Well search dated October 1996.

Public Well as reported in the "Atlas of the Public Water Supply Sources & Drainage Basins of Connecticut", dated June 1982. (abandoned)

Residential well (to be abandoned)

Property line (approximate location)

Search area based on approximate 1/4 mile buffer zone beyond property line.

Areas which are not part of the East Hartford Main Street Facility

MAP REFERENCE:
BASED ON DRAWING OBTAINED FROM ENVIRONMENTAL DATA RESOURCES, INC (EDR) AND FROM INFORMATION PRODUCED IN THE PUBLICATION ENTITLED, "ATLAS OF THE PUBLIC WATER SUPPLY SOURCES & DRAINAGE BASINS OF CONNECTICUT, DATED JUNE 1982.

0 1/8 1/4 1/2

Scale in Miles

FIG. A-5

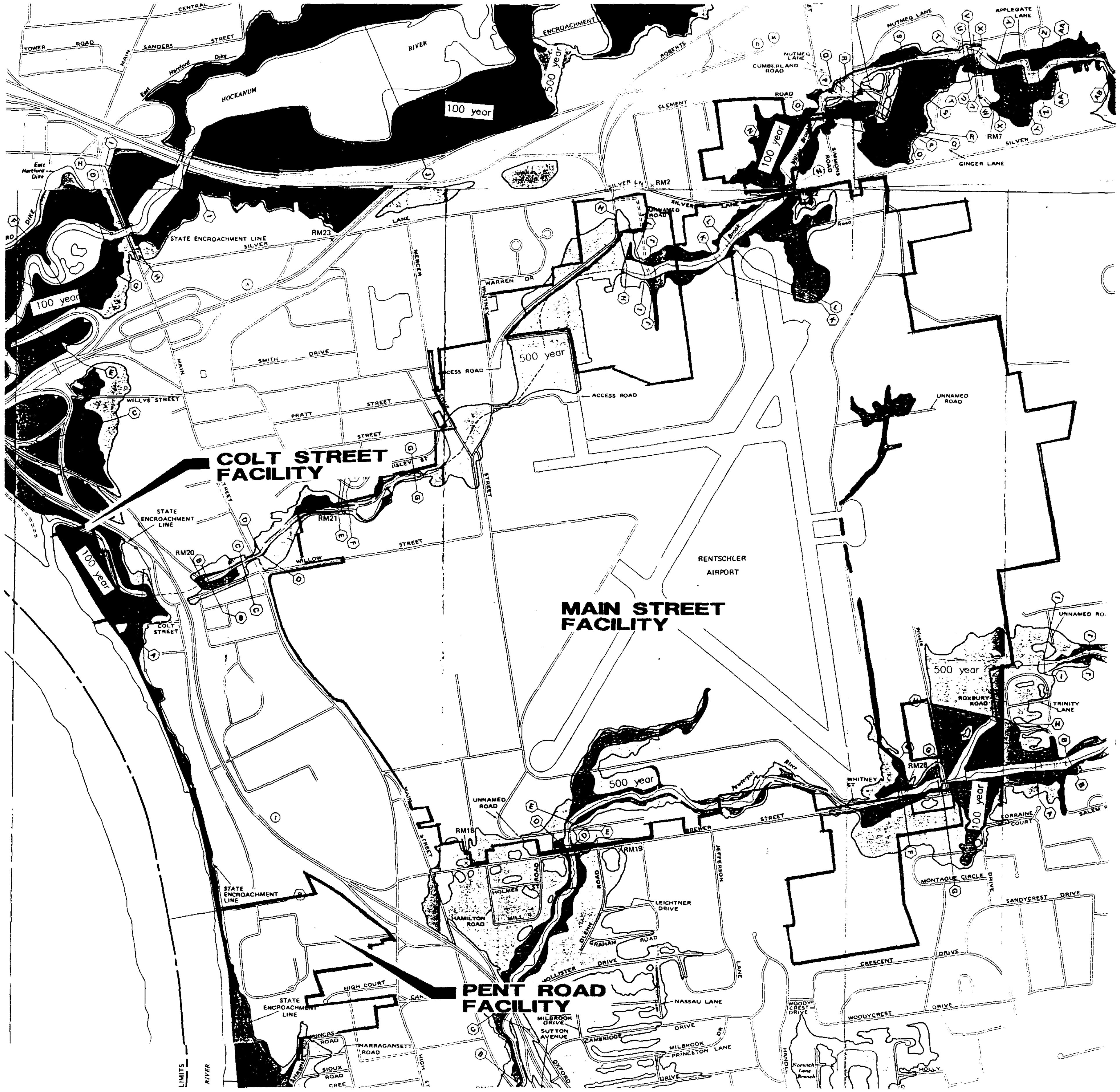
VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY MAIN STREET FACILITY

WATER SUPPLIES

Comm.No.
68VC601

Pratt & Whitney A United Technologies Company / LEA

VEH-FIGS (1)



KEY TO MAP

500-Year Flood Boundary
100-Year Flood Boundary
FLOODWAY FRINGE — FLOODWAY — 100 year
100-Year Flood Boundary
500-Year Flood Boundary — 500 year
Approximate 100-Year Flood Boundary
Cross Section Line — (A) — (A)
Elevation Reference Mark — RM7×
River Mile — • M1.5

APPROXIMATE SCALE
800 0 600 FEET

MAP REFERENCE:
BASED ON INFORMATION OBTAINED FROM THE FLOODWAY FLOOD BOUNDARY AND FLOODWAY MAP FOR THE TOWN OF EAST HARTFORD, CONNECTICUT, HARTFORD COUNTY, COMMUNITY-PANEL NUMBERS 090026 0001-0004, PANELS 1, 2, 3 & 4 OF 4, MAP REVISED: OCTOBER 23, 1981.

FIG. A-6

VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY MAIN STREET FACILITY

FLOODPLAIN MAP

Comm.No. 68VC601	Pratt & Whitney A United Technologies Company / LEA

VEH-FIGS (1)

APPENDIX B
PENT ROAD FACILITY DESCRIPTION
EAST HARTFORD, CONNECTICUT

NOVEMBER 22, 1996

Prepared By:

PRATT & WHITNEY
400 Main Street
East Hartford, Connecticut

In Association With:

LOUREIRO ENGINEERING ASSOCIATES
100 Northwest Drive
Plainville, Connecticut

LEA Comm. No. 68VC601

Table of Contents

FIGURES

TABLES

B1. SITE LOCATION AND DESCRIPTION

The Pratt & Whitney Pent road facility, known as the Andrew Willgoos turbine laboratory, is located on Pent road in East Hartford, Connecticut. The site occupies approximately 58 acres, as shown on figure b-1 and b-2. The Pent road facility is a jet engine test facility used for the experimental testing of jet engines and jet engine components.

The Connecticut River flows in a southerly direction along the western edge of the site. The site lies at approximately 35 feet above mean sea level and has little topographic relief.

B1.1 Site Use and Ownership

The site has been owned and operated by Pratt & Whitney since approximately 1949, when the original laboratory buildings were built. Pratt & Whitney uses the site to test engines and components. Support/ancillary operations on site include a fuel storage and distribution system and a laboratory. Prior to Pratt & Whitney's ownership, the site was undeveloped (Halliburton NUS, 1992). No formal review of property title was undertaken as a part of the preparation of this work plan.

B1.2 Review of Published Information

Database searches were performed to retrieve historical information available for the Pratt & Whitney Pent Road site in East Hartford, Connecticut. LEA contracted with Environmental Data Resources, Inc (EDR) to provide copies of all available fire insurance and historical topographic maps of the area.

B1.2.1 City Directory Search

EDR was unable to locate city directories for East Hartford.

B1.2.2 Fire Insurance Map Review

Twenty-four Sanborn® maps were available for the general East Hartford area in the vicinity of the facility. Maps were available for the following years: 1903 (2 maps); 1908 (3 maps); 1913 (4 maps); 1920 (4 maps); 1927 (3 maps); 1949 (3 maps); and 1968 (5 maps). However, the site was never directly mapped by the Sanborn Company, either because it was undeveloped, used solely for residential/agricultural purposes, or was inaccesible. The 1968 Sanborn® maps do include the intersection of Pent Road and Main Street. Two buildings are shown close to the corner. There is no indication of the type of materials that were stored in the buildings. There was no further mapping to the west on the 1968 maps.

Additional fire insurance maps for the East Hartford area were not discovered by EDR.

B1.2.3 Topographic Map Review

The Pent Road facility is located on the U.S. Geological Survey topographic map of the Hartford South quadrangle. EDR was able to locate five historical topographic maps of the Hartford South quadrangle (1964, 1972, 1976, 1984, and 1992).

In general, the maps show little change to the facility except expansion. The 1964 topographic maps shows the site as similar to its present configuration, but with smaller buildings. The 1972 and 1984 maps show considerable expansion over the previous years and the 1992 shows minor expansion.

B1.2.4 Aerial Photograph Review

LEA contracted with Environmental Data Resources, Inc. (EDR) to determine the extent of historical aerial photographs readily available for this area. EDR's review of historic aerial photographs indicated that the oldest readily available photograph was from 1951. A color infrared photograph was reported to be available from 1986. The origins of the photographs were not reported, only the source: National Aerial Resources, Inc. However, it is known that the Town of East Hartford has available aerial photographs from the years 1928 and 1940. No actual review of photographs was undertaken for the preparation of this work plan. That review will be accomplished where necessary during the modified RFI.

B2. ENVIRONMENTAL SETTING

B2.1 Land Use

The site consists of approximately 58 acres of land bordering the Connecticut River to the west. The majority of the site is comprised of the main test facility, paved parking areas, office buildings, the laboratory, and the tank farm. The Pent Road facility is located within an area zoned I-3 (as shown on Figure B-3).

B2.2 Groundwater and Surface Water Classification

The DEP has adopted water quality classifications for the groundwaters and surface waters of the state to categorize the existing quality of the water, the potential uses of the water, allowable discharges to the water, and the long-term state goals for water quality restoration. Surface waters and groundwaters are classified separately, and both classification schemes are based on the water quality standards adopted by the DEP.

The only surface water body in the vicinity of the site is the Connecticut River. The DEP surface water quality classification in the vicinity is SC/SB. A classification of SC/SB indicates that the existing surface water quality is presently not meeting water quality criteria for one or more designated uses due to pollution, but the goal is to restore the water to class SB quality. Designated uses for class SB waters include: marine fish and wildlife habitat, recreation, industrial use, and navigation.

The DEP groundwater classification in the area of the site is GB. A classification of GB indicates that the groundwater is within highly urbanized areas of intense activity and where public water supply is available. Class GB water may not be suitable for direct human consumption due to waste discharges or spills or leaks of chemicals or land use impacts. Designated uses for class GB groundwaters are industrial process water and cooling waters, but are not suitable for direct human consumption. The groundwater classification map for the site is presented as Figure B-4.

B2.3 Water Supplies

Drinking water to the East Hartford area is supplied by the Metropolitan District Commission from reservoirs west of the Connecticut River. No public or private drinking water supply wells are known to be located within a one-mile radius of the facility. The site is located approximately 0.9 miles southwest of former drinking water supply wells DW-1 and DW-2,

fa the facility?

located on the Main Street facility. Both DW-1 and DW-2 were abandoned in 1995. Figure B-5 shows the location of wells from which sample data has been collected by the USGS.

B2.4 Floodplain Information

A copy of the Federal Emergency Management Agency floodplain map is included as Figure B-6. The western portion of the site is located within the 500-year, and 100-year floodplains of the Connecticut River. The hazardous waste storage areas are not located within either the 500-year or the 100-year floodplain.

B2.5 Surface Water Drainage

Surface waters at the site are drained to the Connecticut River via storm drains located throughout the paved areas of the facility. These stormwaters are discharged to the Connecticut River under NPDES Permit Number CT0001376. In general, uncontrolled storm water flow is toward the Connecticut River.

B2.6 Regional Geology

The Pent Road facility lies in the Central Lowlands province of Connecticut, a north-south trending valley system which is approximately 20 miles wide at East Hartford. The lowland consists of a series of parallel valleys separated by linear north-south trending ridges. The Connecticut River flows southward immediately west of the site, draining the northern part of the valley system. The river has created a broad floodplain and eroded terraces in the flatter portion of the valley system.

The unconsolidated sediments in the region were deposited during, and following, the most recent period of glaciation, which ended approximately 10,000 years ago. These materials can be divided into three major units: glacial till and ice-contact stratified sediments, glaciolacustrine deposits, and post-glacial fluvial and eolian deposits. The three units were deposited in the order noted above, with the till and ice-contract sediments generally lying directly over bedrock.

The till is poorly sorted and varies widely from a non-compact mixture of sand, silt, gravel, and cobbles, with trace amounts of clay, to a compact mixture of silt and clay with some sand, gravel, and cobbles. Locally, units consisting of sand and gravel deposited in contact with the ice are present beneath the glaciolacustrine sediments. Glaciolacustrine materials consist of both silt and clay deposited in a glacial lake and sand and gravel deposits formed by beaches and deltas in the lake. These materials may be as much as 270 feet thick in the vicinity of the site.

Post-glacial fluvial sediments consist of sand and silt deposited as the Connecticut River flowed across the exposed deposits of the former lakebed and cut stream terraces into the exposed lacustrine clays and silts. These stream terraces are laterally extensive in the vicinity of the site, and are typically 15 to 30 feet thick. In addition, a thin veneer of eolian (wind-blown) sediments was deposited over parts of the area. These deposits typically consist of yellowish-brown fine- to medium-grained sand and silt. These deposits are only locally important.

The bedrock geology of the region consists of sedimentary and igneous rocks. The bedrock stratigraphy consists of four sedimentary rock formations: the New Haven Arkose and the Shuttle Meadow, East Berlin, and Portland Formations, which are separated by interbedded, laterally continuous basalt flows. The sedimentary units are composed predominantly composed of interlayered gray or reddish siltstones, sandstones, and conglomerates. The bedrock layers dip to the southeast at approximately 10 to 45 degrees towards the Eastern Border fault, which is located approximately 8 to 9 miles east of the site.

B2.7 Site Geology

The general surficial materials in the area of the Pent Road facility have been mapped as terrace alluvium, wind-blown sand, and alluvium (Deane, 1963). Terrace alluvium consists of a thin layer of sand and gravel which caps terraces of the Connecticut River. The wind-blown sand consists of yellowish-brown, medium- to fine-grained sand. The alluvium, which is limited to surface exposures along the Connecticut River, consists of clay, silt, sand, and gravel deposited on the floodplain of the Connecticut River.

Underlying the surficial materials are glaciolacustrine deposits of silt and clay. The clay unit underlying the site has been reported to be approximately 100 to 150 feet thick in this area (Langer, 1974). Bedrock beneath the site consists of the Portland Formation, which is a gray, interbedded sandstone and siltstone.

B2.8 Regional Hydrogeology

The Pent Road site is located within the Upper Connecticut River Regional Drainage Basin. Regional flow in this part of the basin is generally toward the Connecticut River to the west, although local groundwater flow would be controlled by local geologic conditions and anthropogenic features, such as production wells.

There are four distinct saturated hydrogeologic units in the shallow subsurface within the region (from uppermost to lowest): (1) glaciolacustrine silt and sand deposits and post-glacial fluvial deposits; (2) glaciolacustrine clay and silt deposits; (3) till and ice-contact stratified sediments; and (4) sedimentary bedrock (the Portland Formation).

The post-glacial fluvial deposits comprise the majority of the upper aquifer and generally constitute the most important aquifer in the region, primarily due to the saturated thickness and extent. The unconfined aquifer is relatively coarse-grained and supplies much of the groundwater used for municipal and industrial purposes in the region.

The majority of the glaciolacustrine deposits are comprised of silt and clay. These sediments have low permeability and may function as a confining layer. The glaciolacustrine unit also includes limited sand and gravel lenses and areas of sandy beach and deltaic deposits. These deposits may be locally important as aquifers, but are of limited areal extent.

Glacial till is generally thin and discontinuous, poorly sorted, and contains large amounts of silt and clay, although sandy zones exist. This unit is usually a poor aquifer and is rarely used even for domestic production. Ice-contact stratified sediments beneath the silt and clay layer may be coarse-grained and capable of producing large amounts of water, but this unit is not laterally extensive and is therefore only locally important.

The Portland Formation consists of southeastward-dipping, well-cemented beds of sandstone and siltstone. Groundwater flow in the bedrock is primarily within fractured and faulted zones. The Portland Formation is an important source of water for domestic use, but yield is generally not sufficient for large-scale users.

B2.9 Site Hydrogeology

Investigation of site hydrogeology has primarily been limited to the upper zone of the unconsolidated aquifer. Only one on-site monitoring well penetrates below the upper aquifer zone. The available geologic boring logs indicate that the upper aquifer is approximately 14 to 22 feet thick. The unconsolidated material described in the boring logs is consistent with the presence of eolian deposits adjacent to the Connecticut River, as mapped by Deane (1967). The local glaciolacustrine deposit, which appears to be present as least as close as approximately 100 feet from the Connecticut River, acts as a local confining unit and would effectively isolate the upper zone of the unconsolidated aquifer from any lower zones, wherever it is present.

There are no production wells at the Pent Road site. Groundwater flow directions on the site have been inferred based on measured depth to water in 10 shallow groundwater monitoring wells at the site. Groundwater flow, based on the December 1995 well gauging data, is generally toward the south in the northeast portion of the site and turning toward the southwest nearer the Connecticut River (LEA, 1996).

B3. WASTE MANAGEMENT PRACTICES

B3.1 Facility Operations

The Pent Road facility is a jet engine test facility used primarily for the experimental testing of jet engines and jet engine components. The main part of the facility houses test cells where the jet engines are subjected to the temperature and pressure conditions that are encountered in flight. Those buildings also house the infrastructure needed to provide the pressure and temperature conditions necessary to perform the testing (e.g. boilers, compressors, and heaters).

On the eastern part of the site, there is an office building and a laboratory. Fuels and small components are tested on several small test rigs in the laboratory.

To support the jet engine testing and facility operations, the facility also has a fuel storage tank farm. The tank farm has a maximum total storage capacity of approximately 6,600,000 gallons of #6 fuel oil and jet fuel. In addition, there are small tanks for diesel fuel, gasoline, calibration fluids, and salvaged fuel.

B3.2 Waste Generation, Handling, and Characteristics

Hazardous wastes are generated by the Pent Road facility through testing and research operations, as well as general facility operation and maintenance. In general, the hazardous wastes that have been generated and stored on-site have included acids, alkalis, ignitables, solvents and heavy metals. Non-hazardous wastewaters consisting primarily of non-contact cooling water, steam condensate, city water, and stormwater drainage are discharged to the Connecticut River under NPDES Permit number CT0001376.

B3.3 Waste Disposal Practices

Storage of hazardous wastes occurs on-site in one of two hazardous waste storage areas (HWSAs), designated here as A and B. The interim status HWSA area (HWSA A) has been used for "greater than 90 day" storage of wastes, while the HWSA located in the former X-232 test stand area (HWSA B) has been used for "less than 90 day" storage. The Pent Road facility has submitted a closure plan to the DEP for HWSA A under RCRA. Approval of that plan is currently pending. Upon closure of that unit, the facility "will be reclassified" from an interim status Treatment Storage Disposal Facility (TSDF) to a Generator with less than 90-day storage.

Hazardous wastes are stored on-site in containers while awaiting off-site shipment to the Pratt & Whitney East Hartford facility or to another RCRA-permitted TSDF. According to the 1991

Annual Hazardous Waste Report for the facility, all wastes, with the exception of some waste jet fuels and waste jet fuel/water mixtures, were manifested to the Pratt & Whitney East Hartford facility. No wastes have been treated or disposed of at the Pent Road site.

B4. SUMMARY OF EXISTING CONDITIONS

B4.1 Regulatory Status

A review of US EPA databases indicated that the Pratt & Whitney Pent Road site is listed on the following databases: RCRIS; FINDS; RAATS; PADS; UST; LUST; and NFRAP. In the RCRIS database, the site is listed as both a large quantity generator and a transport, storage or disposal facility.

In the NFRAP (No Further Remedial Action Planned) database, the site was listed as a former CERCLIS listing. Discovery was completed on July 26, 1992 and the Preliminary Assessment was completed on September 23, 1992.

B4.2 Known Releases

LEA contracted with Environmental Data Resources, Inc. (EDR) to review state and federal databases, including the Connecticut database of oil and chemical spills. No releases were reported for the Pent Road site based on those searches. The Oil & Chemical Spills files at the DEP were not reviewed by LEA personnel as a part of the preparation of this work plan. These files will be reviewed in the performance of the modified RFI as necessary.

During a review of the DEP Hazardous Waste Bureau files for the Pent Road site, five references to spills were found. The five letters referenced: disposal of spill clean-up debris contaminated with chromic acid; a 200 gallon spill of "Regal Oil"; a 1,800 gallon spill of nitric acid; a less than 21 gallon spill of Jet A fuel; and, a 3 gallon spill of 35% hydrogen peroxide.

B4.3 Facility Investigations

Several localized investigations have been undertaken at this site in response to specific events (e.g. spills). Not all investigations undertaken at the site will be described here. One larger investigation took place at the tank farm as described below.

In early 1990, petroleum products were noted seeping from the ground near the western edge of the berm around Tank E, which was used at the time for Jet A fuel storage. In April and May of 1990, 42 monitoring/recovery wells were installed throughout the tank farm. On April 13, 1993, Pratt & Whitney employees observed an oil seep from the ground at a location north of the North Dock walkway, northwest of the tank farm. Absorbent pads and booms were placed around the area to protect the Connecticut River (which was at a relatively high stage at that time), from the seep until the waters receded and a subsurface investigation could be undertaken.

In May and June 1993, seven monitoring wells and two soil borings were installed in the area of the North Dock walkway under the direction of Environmental Compliance Services, Inc. (ECS). No separate-phase product was detected in any of the monitoring wells. However, petroleum hydrocarbons, fingerprinted as Jet A fuel, were detected in some soil samples.

There have also been several smaller investigations conducted which have been associated with construction and/or repair operations. These investigations have typically been restricted to the immediate area that would be disturbed by the construction or repair operations to be performed.

B4.4 Identification of Environmental Units

Halliburton NUS Corporation conducted a preliminary assessment (PA) of the facility in 1992. During the May 8, 1992 on-site reconnaissance, Halliburton NUS Corporation identified four areas of concern (AOCs) at the facility. The preliminary assessment did not reveal any previously unknown or unsuspected conditions, and the report concluded that the site should be referred to the US EPA RCRA program for further evaluation. These AOCs are summarized in Table B-1. No other formal identification of environmental units has been undertaken, but the identified AOCs have been re-numbered as Environmental Units for the purposes of the VCAP. These numbers are included in Table B-1.

B4.5 Remediation Activities

Product recovery was initiated from the wells in the Tank E area after installation of the wells in 1990. Approximately 8,000 gallons of separate-phase product were reported to have been recovered before the continuous operation of the system was halted in the fall of 1991. From the fall of 1991 on, product recovery was attempted only when and where separate-phase product was detected in the monitoring wells based on regular monitoring of the wells for separate phase product. Tank E was removed in the fall of 1993.

Although significant amounts of separate-phase product have not been detected in the area since recovery operations were ceased, residual product saturation in the soil caused Pratt & Whitney to construct a bioventing system to address residual separate-phase product saturation in the soil. During the summer of 1994, a bioventing pilot system was installed and operated in the former Tank E area. Beginning in the fall of 1994, the system was operated for an extended period (over 6 months) to evaluate the effectiveness of the system during cold weather.

In the North dock walkway area, because monitoring wells in the tank farm area did not contain separate phase product, transfer lines and drain pits in the area were suspected of the leak.

Subsequent hydrostatic testing of the fuel lines indicated that line 9W, a two-inch fuel transfer line, had failed. The line was immediately drained and abandoned.

Is this normal practice.

TABLES

Table B-1
IDENTIFICATION OF ENVIRONMENTAL UNITS
Pent Road Facility,
East Hartford, Connecticut

EU ID	AOC ID	Name	Description
EU 1	AOC #1	Trichloroethylene Cooling System	This unit consists of the trichloroethylene-based heat exchange system used for jet engine intake air cooling. This unit was placed into operation in the 1950s and operation continues. There is no evidence of releases from this unit.
EU 2	AOC #2	Hazardous Waste Storage Area	This unit consists of a concrete-floored building used to store hazardous wastes. The concrete floor is sealed with a chemical resistant coating. This unit is divided into two areas: greater than 90-day storage and less than 90 day storage. This unit was placed into operation in 1982 and operation continues, however, the greater than 90-day storage area has been closed, so that the facility may be reclassified as a generator only. Operation of the less than 90-day storage area continues. There is no evidence of releases from this unit.
EU 3	AOC #3	Tank Farm and Fuel Transfer System	This unit consists of an aboveground tank farm used to store jet fuel, fuel oil, and other fuels. The unit has a total maximum storage capacity of 6,600,000 gallons. The operation continues, although some tanks have been removed. There have been several documented releases from this unit and several remedial investigations.
EU 4	AOC #4	Barrel Storage Lot	This unit consists of an asphalt-paved area formerly used to store 55-gallon drums of wastes. This unit was in operation from 1950 until 1991. There was at least one known release from this unit.

NOTES:
EU = Environmental Unit
AOC = Area of Concern
AOC designation taken from report prepared by Halliburton NUS Corporation (1992).

FIGURES

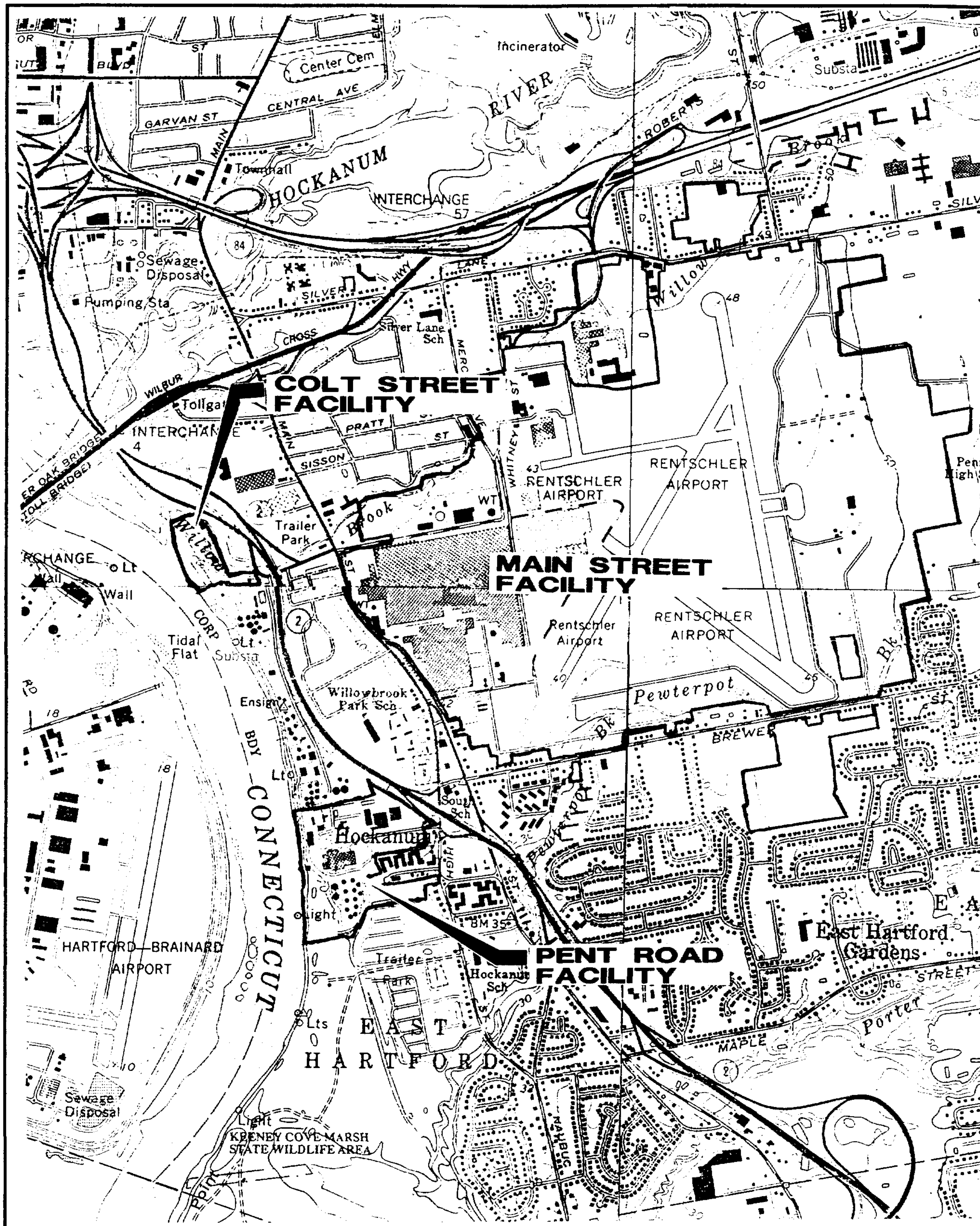


FIG. B-1

MAP REFERENCE:
USGS 7.5 MINUTE SERIES QUADRANGLES FOR HARTFORD NORTH, HARTFORD SOUTH, GLASTONBURY, AND MANCHESTER CONN., DATED 1964 & 1963 AND REVISED 1992.

1000 0 1000 2000 3000

SCALE IN FEET

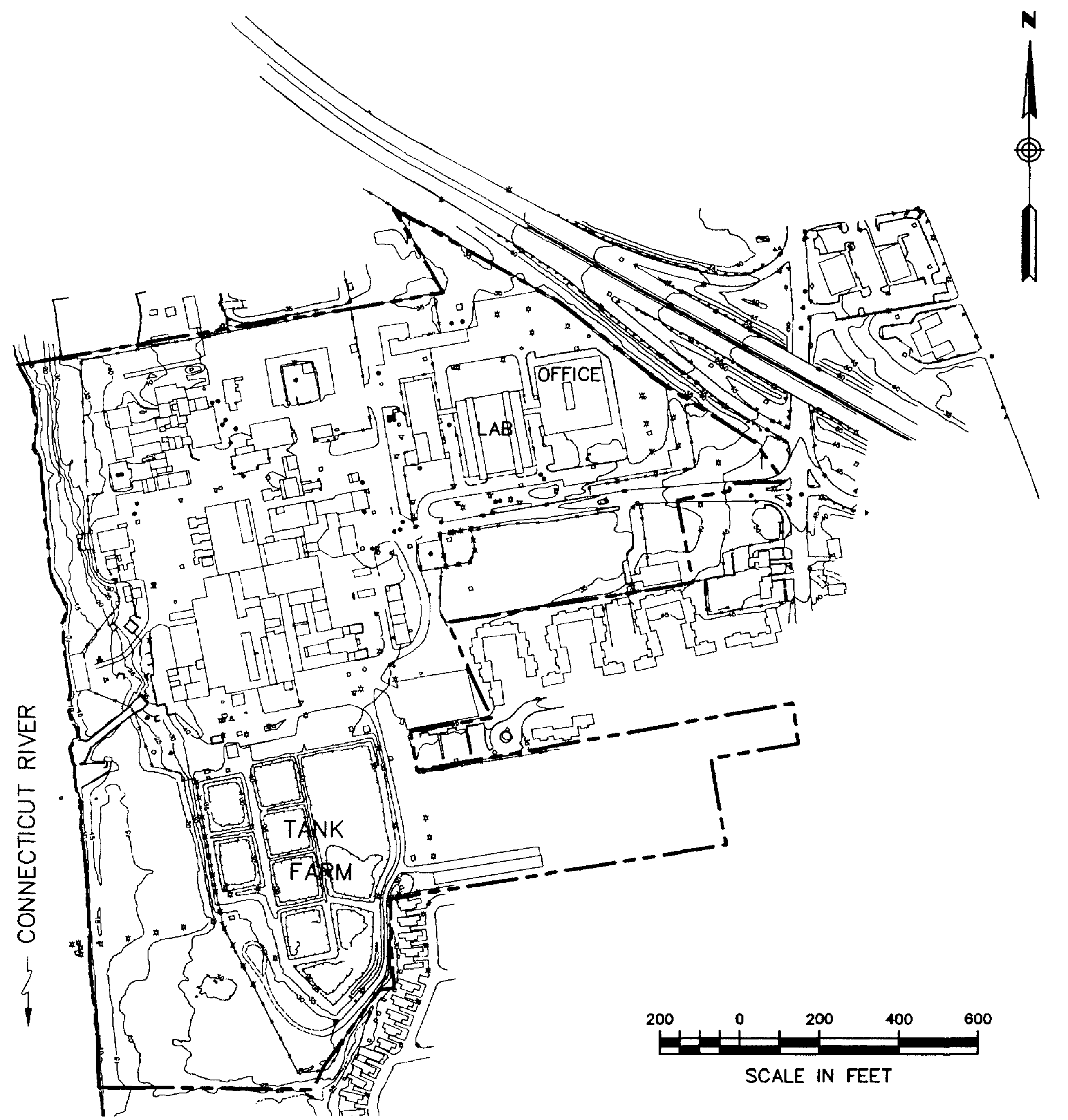
VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY PENT ROAD FACILITY

USGS TOPOGRAPHIC MAP

Comm.No. 68VC601

Pratt & Whitney A United Technologies Company / LEA

VEH-FIGS (1)



LEGEND

Property line
(Approximate location)

FIG. B-2

VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY PENT ROAD FACILITY

SITE PLAN

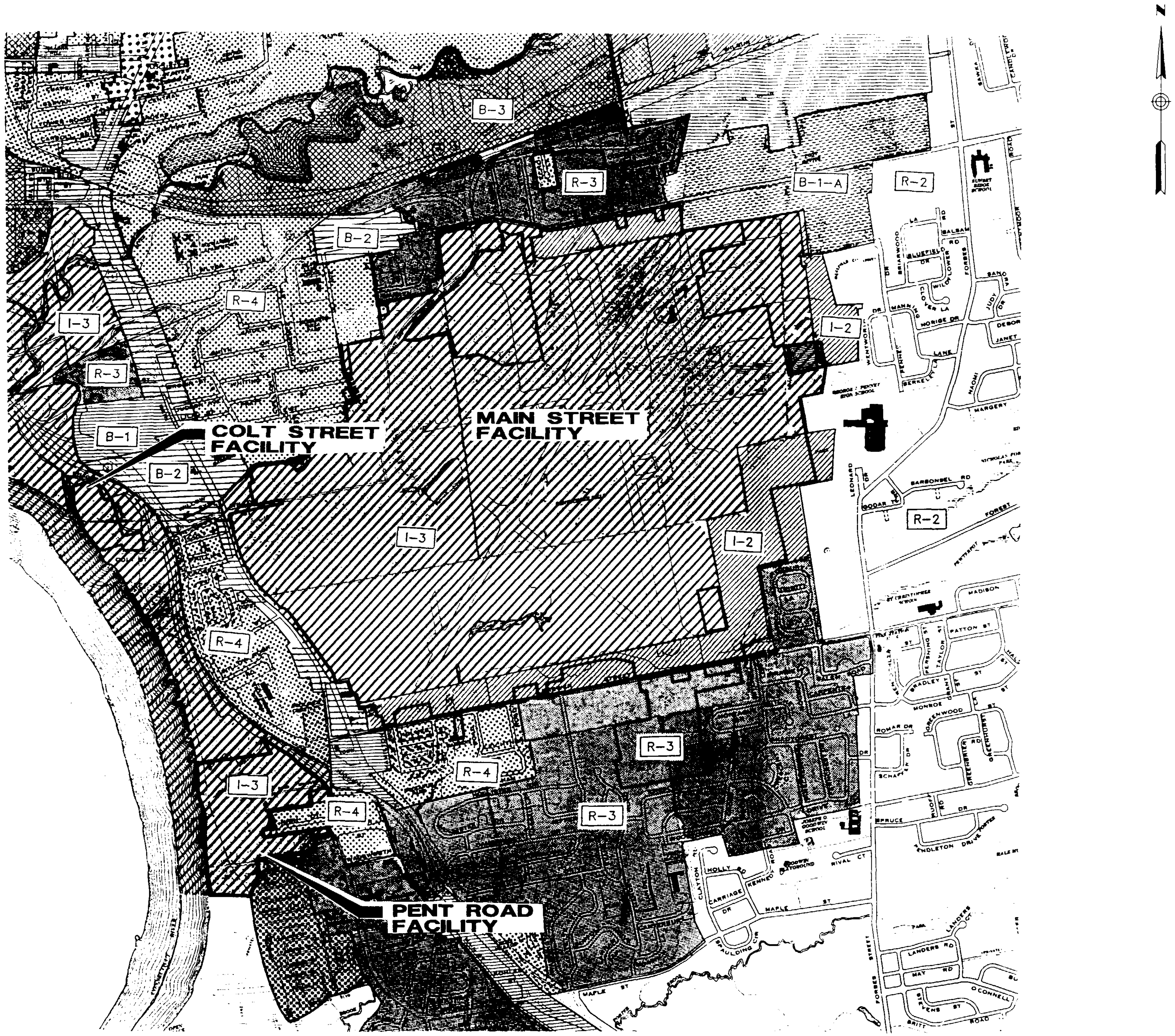
MAP REFERENCE:

SURVEY CONTROL BY FUSS & O'NEILL, INC
PHOTOGRAMMETRY BY
GOLDEN AERIAL SURVEYS, INC
DATE OF PHOTOGRAPHY: 3/17/91

Comm.No.
68VC601

Pratt & Whitney
A United Technologies Company
/ LEA

VWG-FIG2 (400)



LEGEND

- Residence 2 (R-2)
- Residence 3 (R-3)
- Residence 4 (R-4)
- Residence 6 (R-6)
- Business 1-A (B-1-A)
- Business 1 (B-1)
- Business 2 (B-2)
- Business 3 (B-3)
- Business 4 (B-4)
- Business 5 (B-5)
- Industry 1 (I-1)
- Industry 2 (I-2)
- Industry 3 (I-3)

MAP REFERENCE:
ZONING MAP OF THE TOWN OF EAST HARTFORD
ADOPTED AUGUST 1, 1981.
LAST REVISION DATE: FEBRUARY 29, 1996

800 0 800 1600 2400
SCALE IN FEET

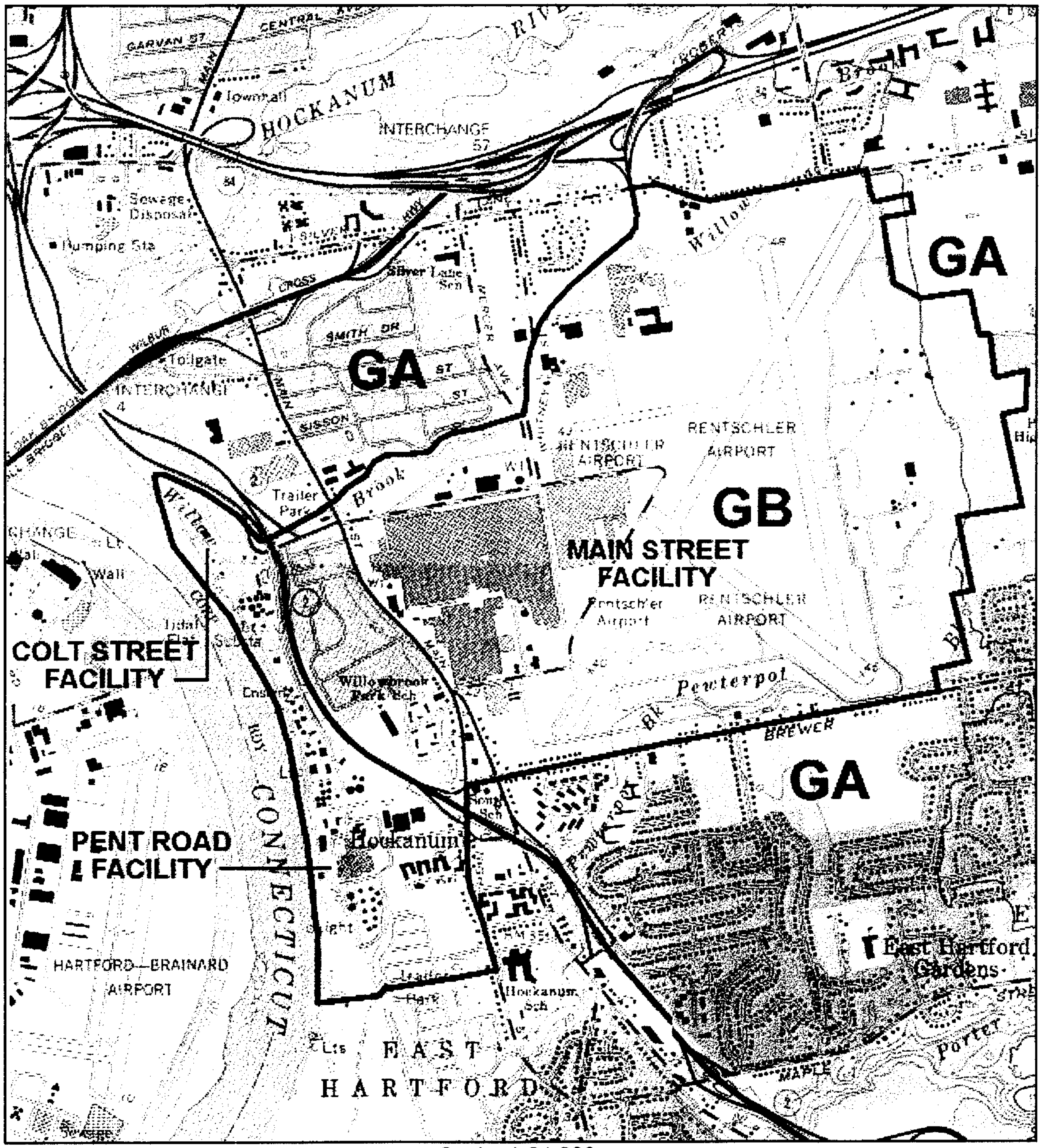
FIG. B-3

VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY PENT ROAD FACILITY

ZONING MAP

Comm.No. 68VC601

Pratt & Whitney A United Technologies Company / LEA



Scale: 1:24,000

1000 0 1000 2000 3000

SCALE IN FEET

NOTES:
Groundwater classifications from "ADOPTED WATER QUALITY CLASSIFICATIONS FOR THE CONNECTICUT RIVER BASIN: CTDEP, JUNE, 1988. Modified per groundwater classification, JUNE, 1996.

MAP REFERENCE:
USGS 7.5 MINUTE SERIES QUADRANGLES FOR HARTFORD NORTH, HARTFORD SOUTH, GLASTONBURY, AND MANCHESTER CONN., DATED 1964 & 1963 AND REVISED 1992.

FIG. B-4

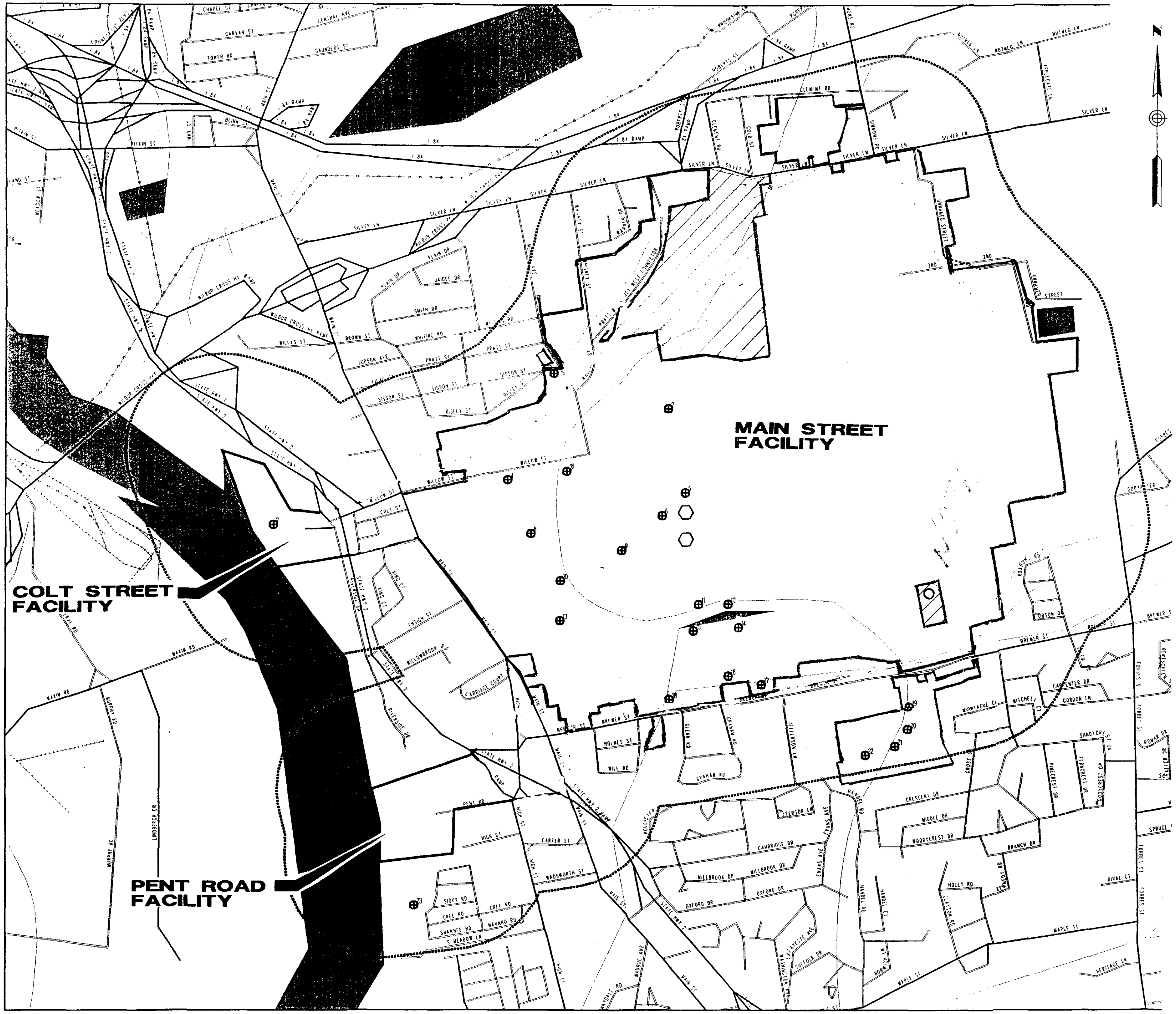
VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY PENT ROAD FACILITY

GROUNDWATER CLASSIFICATIONS

Comm.No. 68VC601

Pratt & Whitney / LEA
A United Technologies Company

VEH-FIGS (1)



LEGEND

- Well identified by EDR's Well search dated October 1996.
- Public Well as reported in the "Atlas of the Public Water Supply Sources & Drainage Basins of Connecticut", dated June 1982. (abandoned)
- Residential well (to be abandoned)
- Property line (approximate location)
- Search area based on approximate 1/4 mile buffer zone beyond property line.
- Areas which are not part of the East Hartford Main Street Facility

MAP REFERENCE:
BASED ON DRAWING OBTAINED FROM ENVIRONMENTAL DATA RESOURCES, INC (EDR) AND FROM INFORMATION PRODUCED IN THE PUBLICATION ENTITLED, "ATLAS OF THE PUBLIC WATER SUPPLY SOURCES & DRAINAGE BASINS OF CONNECTICUT, DATED JUNE 1982.

0 1/8 1/4 1/2

Scale in Miles

FIG. B–5

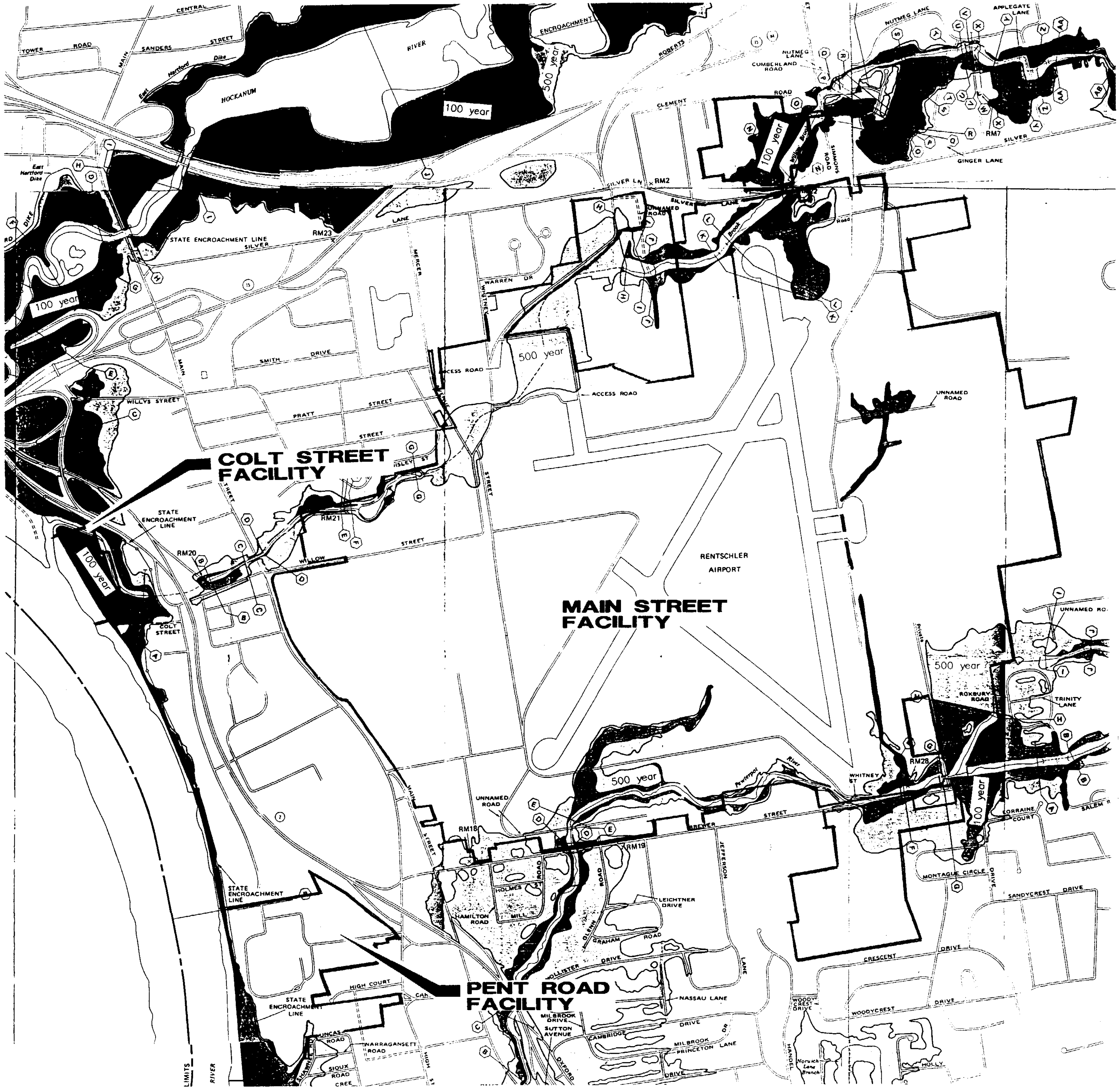
VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY PENT ROAD FACILITY

WATER SUPPLIES

Comm.No. 68VC601

Pratt & Whitney A United Technologies Company / LEA

VEH-FIGS (1)



KEY TO MAP

N

500-Year Flood Boundary	
100-Year Flood Boundary	100 year
FLOODWAY FRINGE	FLOODWAY
100-Year Flood Boundary	500 year
500-Year Flood Boundary	
Approximate 100-Year Flood Boundary	
Cross Section Line	(A)———(A)
Elevation Reference Mark	RM7×
River Mile	•M1.5

APPROXIMATE SCALE
600 0 600 FEET

MAP REFERENCE:
BASED ON INFORMATION OBTAINED FROM THE FLOODWAY FLOOD BOUNDARY AND FLOODWAY MAP FOR THE TOWN OF EAST HARTFORD, CONNECTICUT, HARTFORD COUNTY, COMMUNITY-PANEL NUMBERS 090026 0001–0004, PANELS 1, 2, 3 & 4 OF 4, MAP REVISED: OCTOBER 23, 1981.

FIG. B–6

VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY PENT ROAD FACILITY

FLOODPLAIN MAP

Comm.No. 68VC601

Pratt & Whitney A United Technologies Company / LEA

VEH–FIGS (1)

APPENDIX C
COLT STREET FACILITY DESCRIPTION
EAST HARTFORD, CONNECTICUT

NOVEMBER 22, 1996

Prepared By:

PRATT & WHITNEY
400 Main Street
East Hartford, Connecticut

In Association With:

LOUREIRO ENGINEERING ASSOCIATES
100 Northwest Drive
Plainville, Connecticut

LEA Comm. No. 68VC601

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FIGURES

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C1. SITE LOCATION AND DESCRIPTION

The Colt Street facility (EPA ID # CTD000844399) is located in East Hartford, Connecticut. The approximately 12-acre parcel lies to the south and east of Willow Brook and east of the Connecticut River. Figure C-1 is a USGS map showing the location of the facility.

The Colt Street facility maintains an industrial wastewater treatment system which receives wastewater via a pipeline from the Main Street facility in East Hartford and discharges treated wastewater to the Connecticut River. The effluent discharge line was diverted from Willow Brook to the Connecticut River in 1989 and a diffuser was added in 1991 to provide better mixing.

C1.1 Site Use and Ownership

The Colt Street facility has been operated by Pratt & Whitney since 1972, treating dilute process wastewater from the nearby Main Street facility. The wastewaters undergo physical-chemical treatment on this site. The treated wastewater is discharged under NPDES Permit Number CT 0001376. Sludges are produced from the process and transported offsite for disposal. These wastes used to be dewatered and stored in the two surface impoundments which are situated to the west of the facility. These surface impoundments have been inactive since 1982. A site plan of the site is presented in Figure C-2.

The former thickened sludge lagoon was constructed utilizing on-site material to form the earthen dikes which contained approximately 6,125 square feet and had an effective capacity of 1,000 CY with a depth of 4.5 feet. Sludge accumulating in various treatment tanks of the dilute industrial wastewater treatment facility was deposited of in the thickened sludge lagoon. Sludge and contaminated soil from this area were excavated and removed in 1982. Residual contaminated soil was removed in 1984 and 1985. The area was backfilled and regraded by October 1985.

The former filtered sludge lagoon was similarly an unlined storage area constructed utilizing on-site material to form the earthen dikes which contained an area of approximately 20,875 square feet with an effective capacity of 6,570 CY and a depth of 8.5 feet. This unit accepted metal hydroxide sludge after thickening and dewatering using vacuum filters to produce a filter cake with a 35-45% solids content. This area was also excavated, backfilled and regraded by October 1985.

C1.2 Review of Published Information

C1.2.1 City Directory Search

A review of historical city directories was performed by EDR Sanborn. EDR was unable to locate any information pertinent to the Colt Street facility.

C1.2.2 Fire Insurance Map Review

Database searches were performed to retrieve historical information available for the Colt Street facility. A search performed by EDR Sanborn, Inc. revealed that Sanborn® fire insurance maps are available for the general East Hartford area for the following years: 1903 (2 maps); 1908 (3 maps); 1913 (4 maps); 1920 (4 maps); 1927 (3 maps); 1949 (3 maps); and 1968 (5 maps). The Pratt & Whitney Colt Street site was never directly mapped by the Sanborn Company, either because the site was solely used for residential/agricultural purposes or, in later years, because the site was inaccessible.

The following is a description of the area of the Colt Street site based on the review of the Sanborn maps. It should be noted that this description may not be an accurate reflection of what was actually in the area during these times, but in most cases it is a good indicator of the general character. In 1903/1908, the Main Street area of East Hartford was primarily a mixture of residences and tobacco sheds and the area to the northeast of the Brewer Street - Main Street intersection was "vacant." No mapping was available for the Colt Street facility area from this time. In 1913, portions of Colt Street were a mixture of residences and tobacco sheds. Nothing changed until 1927, when Colt Street was primarily residential, with one remaining tobacco shed and a warehouse along the street. In 1949, only the western end of Colt Street was mapped showing it similar to 1927 with a store and a warehouse on the south side of the street near Main Street. In 1968, the area to the north of the Colt Street facility was not mapped, however the area immediately to the south, along the Connecticut River, was labeled as a "fuel oil pumping station." The American Coal Company offices and tank farm were located at the corner of Colt Street and Main Street, and several other tank farms and a transformer yard were located further south of the Colt Street site.

C1.2.3 Topographic Map Review

EDR also conducted a historical topographic map search. The Colt Street facility is located on the USGS Hartford North quadrangle. The search revealed 5 historical topographic maps of the Colt Street area for the years: 1952; 1964; 1974; 1984; and 1992. The 1952, 1964, and 1972 topographic maps show that the area was undeveloped until after 1972. The 1984 and 1992 topographic maps show that the site was developed between 1972 and 1984 and that no changes appear to have taken place in the facility between 1984 and 1992.

C1.2.4 Aerial Photograph Review

A survey of aerial photographs available for the site was also performed by EDR Sanborn, Inc. EDR's review of available historic aerial photographs indicated that the oldest available sources was from 1951. A color infrared photograph was reported to be available from 1986. The origins of the photographs were not reported. The source of the photographs was National Aerial Resources, Inc. These photographs were not reviewed in preparing the VCAP Work Plan but will be reviewed as appropriate in conducting the modified RFI.

C2. ENVIRONMENTAL SETTING

C2.1 Land Use

The property surrounding the facility is zoned for industrial use. The area further to the north and west of the site is zoned for business use respectively. A residential area is located further to the south. Figure C-3 is an excerpt from the Town of East Hartford Zoning Map showing the facility and surrounding area.

C2.2 Groundwater and Surface Water Classifications

The DEP has adopted water quality classifications for the groundwaters and surface waters of the state to categorize the existing quality of the water, the potential uses of the water, allowable discharges to the water, and the long-term state goals for water quality restoration. Surface waters and groundwaters are classified separately, and both classification schemes are based on the water quality standards adopted by the DEP.

The groundwaters underneath the facility have been classified by the DEP as GB as shown on Figure C-4. Figure C-4 is an excerpt from the map "Adopted Water Classifications for the Connecticut River Basin" prepared by the DEP and dated June 1988. A classification of GB denotes groundwaters within highly urbanized areas or intense industrial activity and where a public water supply is available.

The surface water classification of the Connecticut River in the area is SC/SB denoting a surface water goal of SB (suitable to receive cooling water discharges and discharges from municipal and industrial wastewater treatment system). The SC designation indicates that this reach of the river is not presently meeting the SB goal. Willow Brook is classified as a B stream.

C2.3 Water Supplies

A review of the "Atlas of the Public Water Supply Sources & Drainage Basins of Connecticut" published by the DEP and dated June 1982 identified only two public drinking water supplies within a 1,000-foot radius of the facility. These two wells were located on the Main Street facility and have been abandoned. A well search performed by EDR revealed the presence of several wells in the general vicinity of the site as noted on Figure C-5. These wells are reported in EDR's database as water withdrawal wells for industrial use, or unused test wells. One of the wells identified by EDR is located within the Colt Street site.

Potable water is presently supplied to the facility and greater the East Hartford area by the Metropolitan District Commission (MDC) of Hartford County. The closest public well fields are located in South Windsor, Manchester, and Glastonbury, about 5 to 5 ½ miles northeast, east, and southeast of the site, respectively (DEP, 1982 and DEP, 1986).

C2.4 Floodplain Information

Floodplain information for East Hartford, Connecticut has been developed by the National Flood Insurance Program, and is presented in Community-Panel Number 090026 0003 D. As shown on Figure C-6, the former metal hydroxide surface impoundments on this facility are located within the approximate 100-year flood zone. The Connecticut River and Willow Brook floodways occur in the northeastern and western portions of the facility. A 500-year flood zone is located about 300 feet east of the former lagoon and filter cake storage area.

C2.5 Surface Water Drainage

Based on site topography, surface water run-off generally drains to the Connecticut River and Willow Brook. Willow Brook flows northwest near the facility, then curves abruptly to the south, where it enters the Connecticut River. According to the RCRA Part B Post Closure Permit Application (Haley & Aldrich, December 1991), a 1945 topographic map that pre-dates facility construction indicates site topography and associated drainage patterns similar to the existing ones.

Most of the site sits approximately 20 feet above the mean water levels of the adjacent Willow Brook and Connecticut River. The facility is generally flat. Ground surface topography at the site presently ranges from about elevation 30 NGVD[1] in the southeast portion of the facility to less than elevation 5 along the Connecticut River and Willow Brook. Adjacent to the former thickened sludge and filter cake surface impoundments in the northern portion of the facility, the ground surface slopes steeply down to Willow Brook. To the west, the slope to the Connecticut River is gradual.

[1] All elevations refer to the National Geodetic Vertical Datum of 1929.

C2.6 Regional Geology

The Colt Street facility lies in the Central Lowlands province of Connecticut, a north-south trending valley system which is approximately 20 miles wide at East Hartford. The lowland consists of a series of parallel valleys separated by linear north-south trending ridges. The Connecticut River flows southward immediately west of the site, draining the northern part of the valley system. The river has created a broad floodplain and eroded terraces in the flatter portion of the valley system.

The unconsolidated sediments in the region were deposited during, and following, the most recent period of glaciation, which ended approximately 10,000 years ago. These materials can be divided into three major units: glacial till and ice-contact stratified sediments, glaciolacustrine deposits, and post-glacial fluvial and eolian deposits. The three units were deposited in the order noted above, with the till and ice-contract sediments generally lying directly over bedrock.

The till is poorly sorted and varies widely from a non-compact mixture of sand, silt, gravel, and cobbles, with trace amounts of clay, to a compact mixture of silt and clay with some sand, gravel, and cobbles. Locally, units consisting of sand and gravel deposited in contact with the ice are present beneath the glaciolacustrine sediments. Glaciolacustrine materials consist of both silt and clay deposited in a glacial lake and sand and gravel deposits formed by beaches and deltas in the lake. These materials may be as much as 270 feet thick in the vicinity of the site.

Post-glacial fluvial sediments consist of sand and silt deposited as the Connecticut River flowed across the exposed deposits of the former lakebed and cut stream terraces into the exposed lacustrine clays and silts. These stream terraces are laterally extensive in the vicinity of the site, and are typically 15 to 30 feet thick. In addition, a thin veneer of eolian (wind-blown) sediments was deposited over parts of the area. These deposits typically consist of yellowish-brown fine- to medium-grained sand and silt. These deposits are only locally important.

The bedrock geology of the region consists of sedimentary and igneous rocks. The bedrock stratigraphy consists of four sedimentary rock formations: the New Haven Arkose and the Shuttle Meadow, East Berlin, and Portland Formations, which are separated by interbedded, laterally continuous basalt flows. The sedimentary units are composed predominantly of interlayered gray or reddish siltstones, sandstones, and conglomerates. The bedrock layers dip to the southeast at approximately 10 to 45 degrees towards the Eastern Border fault, which is located approximately eight to nine miles east of the site.

C2.7 Site Geology

Unconsolidated deposits in the vicinity of the site are consistent with published data. Regionally, the unconsolidated materials were deposited within a bedrock valley trending roughly north-south and centered over the Pratt & Whitney Rentschler Airport about 1 mile east of the Colt Street Facility. Explorations within this bedrock valley indicate that the Hitchcock deposits pinch out along the rising bedrock surface about 1.5 miles east of, and about 0.8 miles west of the facility.

The uppermost unit of the unconsolidated materials consists of alluvial sand and silt in most areas of the facility. However, approximately 2 to 10 feet of fill were encountered above the alluvial deposits in borings in the vicinity of the former thickened sludge lagoon, filter cake storage area, and the wastewater treatment plant south of the lagoon. The fill typically consisted of mixed silt, sand and gravel. Small amounts of clay and occasional asphalt fragments were noted in the fill near the wastewater treatment plant.

The stream terrace deposits and floodplain alluvium constitute a laterally continuous sand and silty layer about 10 to 15 feet thick across most of the site. Underlying these sediments is a thick sequence of glaciolacustrine silt and clay that was originally deposited in the glacial lake that once occupied the valley. The thickness of the silt and clay layer ranged from approximately 90 to 120 feet in borings conducted at or near the site. This unit typically consists of finely laminated to well-bedded clay and silt, with occasional, discontinuous lenses and layers of fine sand.

Beneath the silt and clay layer are either deposits of glacial outwash or glacial till. In some areas, glacial outwash deposits may overlie or have replaced glacial till subsequent to erosion. This was evidenced in an on-site boring in which approximately four feet of sand and gravel was encountered at a depth of 135 feet. Glacial till was not observed in this boring. In another boring, glacial outwash consisting of fine sand and silt was observed overlying till at depths between 113 and 121 feet. At another location, four feet of glacial till was encountered directly overlying bedrock, which was encountered at a depth of 125 feet. The till was described as a dense mixture of sand and silt, with some gravel and rock fragments.

According to maps published by the U. S. Geological Survey, bedrock underlying the facility is the Portland Formation, which consists of an interbedded sandstone and siltstone in the vicinity of the facility. A deep test boring completed approximately 200 feet north of the facility encountered weathered bedrock at a depth of 125 feet below ground surface. The upper five feet of bedrock was described as a thinly bedded, red-brown, fine-grained sandy siltstone. The bedrock was slightly weathered and contained shallow-dipping joints.

C2.8 Regional Hydrogeology

The Pratt & Whitney Colt Street facility is located within the Upper Connecticut River Regional Drainage Basin. Regional flow in this part of the basin is expected to be toward the Connecticut River to the west, although local groundwater flow would be controlled by local geologic conditions and anthropogenic features, such as production wells. There are four distinct saturated hydrogeologic units in the shallow subsurface within the region (from uppermost to lowest): (1) glaciolacustrine silt and sand deposits and post-glacial fluvial deposits; (2) glaciolacustrine clay and silt deposits; (3) till and ice-contact stratified sediments; and (4) sedimentary bedrock (the Portland Formation).

The post-glacial fluvial deposits comprise the majority of the upper aquifer and generally constitute the most important aquifer in the region, primarily due to the saturated thickness and extent. The unconfined aquifer is relatively coarse-grained and supplies much of the groundwater used for municipal and industrial purposes in the region.

The majority of the glaciolacustrine deposits are comprised of silt and clay. These sediments have low permeability and may function as a confining layer. The glaciolacustrine unit also includes limited sand and gravel lenses and areas of sandy beach and deltaic deposits. These deposits may be locally important as aquifers, but are of limited areal extent.

Glacial till is generally thin and discontinuous, poorly sorted, and contains large amounts of silt and clay, although sandy zones exist. This unit is usually a poor aquifer and is rarely used even for domestic production. Ice-contact stratified sediments beneath the silt and clay layer may be coarse-grained and capable of producing large amounts of water, but these deposits are not laterally extensive and are therefore only locally important.

The Portland Formation consists of southeastward-dipping, well-cemented beds of sandstone and siltstone. Groundwater flow in the bedrock is primarily within fractured and faulted zones. The Portland Formation is an important source of water for domestic use, but yield is generally not sufficient for large-scale users.

C2.9 Site Hydrogeology

The primary aquifers in the vicinity of the facility include the uppermost aquifer comprised of alluvial sands and the deeper sedimentary bedrock aquifer. Groundwater has also been obtained from the outwash sands and gravel overlying bedrock. However, the apparent limited thickness and discontinuity of the outwash deposits in this area restrict their use as a significant groundwater resource. Groundwater occurs under water-table conditions in the alluvial sand (uppermost zone of the unconsolidated aquifer). Pumping wells screened in the upper alluvial sand aquifer approximately ½ mile east of the Colt Street facility were formerly used by Pratt & Whitney for process water and potable water supplies. Well yields greater than 75 gallons per minute have been reported for several of these wells.

Groundwater flow between the shallow sand aquifer and deeper portions of the unconsolidated and bedrock aquifers is inhibited by an aquitard comprised of the thick clay and silt deposits. Thickness of the aquitard in the immediate vicinity of the facility ranges from about 90 to 120 feet.

Groundwater in the bedrock is primarily within fractures and joints. Commercial and industrial wells tapping the sedimentary bedrock in the Hartford area have reported to yield an average of 132 gallons per minute (gpm). A bedrock well was reportedly completed at a depth of 395 feet at the Colt Street Facility in 1955. The well yielded between 80 and 150 gpm.

Groundwater flow direction was evaluated quarterly by Fuss & O'Neill and others between 1982 and 1990. A review of the quarterly groundwater elevation data and the facility setting indicates that shallow groundwater typically flows radially toward Willow Brook and the Connecticut River from the central portion of the facility. The groundwater flow pattern generally mimics the peninsula-like shape of the Colt Street facility.

Water-level monitoring conducted in December 1990 indicates a reversal in the direction of groundwater flow in the vicinity of the former lagoon and filter cake storage area. This apparent flow anomaly is likely to have resulted from flooding of Willow Brook, inferred from review of the water level data. The flooding resulted in higher water levels in wells near the brook versus levels in wells at further inland monitoring points. The apparent reversal of groundwater flow indicates significant hydrologic communication between Willow Brook and the shallow aquifer on site. A similar degree of hydrologic communication may exist between the shallow aquifer and the Connecticut River.

C3. WASTE MANAGEMENT PRACTICES

C3.1 Facility Operations

The Colt Street facility is the site of the dilute industrial wastewater treatment plant serving the Main Street facility. The primary operations producing these wastewaters have included metal cleaning and etching; chromium, nickel, cadmium, silver, and copper plating; anodizing of aluminum and titanium; and machining using soluble oil coolants.

Wastewaters that are currently or were previously conveyed to the Colt Street facility include rinsewaters from metal finishing, inspection and cleaning operations; wastewaters from blast and water-wash spray cabinets, dust collectors, and scrubbers; oily wastewaters generated from engine testing operations; water-soluble oil wastes; and rinsewaters containing chromium and cyanide. Rinsewaters with chromium or cyanide used to be pretreated at the Pratt & Whitney Pretreatment Plant, located at the Main Street facility, prior to being conveyed to the Colt Street facility. However, these rinsewaters are no longer generated in large enough quantities to be treated by Pratt &Whitney.

Wastewaters are received at the Colt Street site via a pipeline from the Main Street facility. Oily wastewaters are passed through an oil skimming system and then are combined with the other wastewaters. The wastewater then undergoes alkaline precipitation to remove heavy metals and suspended solids. The treated wastewater is then discharged under NPDES Permit Number CT 0001376. The sludge from the precipitation phase is thickened and dewatered on vacuum filters to produce a filter cake which is classified as F006 under RCRA regulations. Routine periodic analyses are performed to ensure that the chrome and cyanide concentrated waste pretreatment system and the main industrial waste treatment system are operating properly. Ten ton roll-off containers are used for temporary storage of the sludge generated from the wastewater treatment system.

This sludge used to be dewatered and stored on-site in two former surface impoundments. During operation of the surface impoundments, approximately 200 cubic yards of thickened sludge and 8,000 cubic yards of filter cake were placed in the respective impoundments. The Thickened Sludge Lagoon had approximately 1,000 cubic yards of capacity; it was trapezoidal-shaped, with an average length of about 175 feet and a width of about 65 feet. The Filter Cake Storage Impoundment had an approximately 6,600 cubic yard capacity. The impoundment was generally kidney-shaped, with dimensions of approximately 255 feet along the long axis and 135 feet at the widest point.

C3.1.1 Waste Generation, Handling, and Characteristics

Two wastes are generated at the facility: metal hydroxide sludge, and waste oil. The metal hydroxide sludge (F006) results from the operation of the industrial wastewater treatment system as discussed in the previous section. It is a lime-based sludge which has a solids content of approximately 30 to 45%. The amount of sludge generated each month averages 200 cubic yards. The waste oil is generated by the oil skimming system.

C3.1.2 Waste Disposal Practices

The wastes generated at the Colt Street facility are disposed off-site through licensed vendors. Historically, the metal hydroxide sludge was temporarily stored in two separate surface impoundments at the Colt Street facility. These impoundments did not accept any waste after May 1982 and were backfilled, regraded and seeded in October 1985.

C4. SUMMARY OF EXISTING CONDITIONS

C4.1 Regulatory Status

Pratt & Whitney submitted notification to EPA Region I of their hazardous waste treatment and storage activities at the Colt Street facility on August 18, 1980. The Colt Street facility was assigned EPA ID No. CTD000844399. Pratt & Whitney submitted a RCRA Part A permit application for the storage and treatment of hazardous waste in tanks and two surface impoundments to EPA November 18, 1980. The treatment tanks were erroneously included in the Part A application since they were associated with the on-site wastewater treatment system which is NPDES permitted.

A closure plan for the two surface impoundments was submitted to EPA and DEP on February 14, 1984. Metal hydroxide sludge (F006) had not been added to the impoundments after May 1982 and the remaining sludge was removed in June 1982. Additional material was excavated and removed in August 1984 and the impoundments were backfilled, regraded and seeded in October 1985.

A Post Closure Part B Permit Application for the facility was submitted in December 1991, in response to a permit call from DEP and EPA. The application is still pending.

EDR research indicated that the Colt Street facility is listed on the following databases: RCRIS (as both a large quantity generator and a transport, storage, or disposal facility); FINDS; and NFRAP. In the RCRIS database, the site is listed as both a large quantity generator and a transport, storage or disposal facility. No compliance evaluations or inspections were noted. There was no underground storage tank (UST) listing for the Colt Street facility.

C4.1.1 Known Releases

Several sources were reviewed to identify previous spills that have occurred at the Colt Street facility. A search performed by EDR Sanborn® Inc. did not reveal any spills on the site. Similarly, a survey of the files maintained by the Oil & Chemical Spills Division of the DEP did not reveal any additional information.

C4.1.2 Facility Investigations

Investigations performed at the Colt Street facility were related to the two surface impoundments which had received wastewater treatment sludges generated from electroplating operations (F006). Filter cake and sludge placement in the surface impoundments ceased in May 1982. The stockpiled filter cake (about 8,000 CY) was removed beginning in May 1982; and stockpiled thickened sludge was removed in later closure activities. Additional excavation was performed in August 1984 and April 1985. The two impoundments were backfilled, regraded, and seeded in October, 1985 (CGA Corporation, 1986, and Haley & Aldrich, 1991).

C4.1.3 Identification of Environmental Units

The four Solid Waste Management Units (SWMUs) identified at the site are described in Table C-1. The SWMUs were identified based on information from several sources. In July 1985, Pratt & Whitney submitted information in response to EPA's Corrective Action Information Request. In June 1986, GCA Corporation prepared a RCRA Preliminary Assessment. The previously identified SWMUs have been re-numbered as Environmental Units for the purposes of the VCAP. Those numbers are included on Table C-1.

C4.1.4 Remedial Activities

Activities performed at the facility include the removal of the waste and contaminated soil from the two surface impoundments on-site and the subsequent backfilling, regrading, and seeding of the area.

TABLES

Table C-1 IDENTIFICATION OF ENVIRONMENTAL UNITS Colt Street East Hartford, Connecticut			
EU ID	**SWMU ID**	**Name**	**Description**
EU 1	**SWMU 1**	**Former Thickened Sludge Lagoon**	**Earthen impoundment used for dewatering and storage of liquid metal hydroxide sludge prior to ultimate disposal off the site. Inactive since 1982 and certified closed in 1985.**
EU 2	**SWMU 2**	**Former Filtered Sludge Storage Impoundment**	**Earthen impoundment used for storage of metal hydroxide filter cake prior to ultimate disposal off the site. Inactive since 1982 and certified closed in 1985.**
EU 3	**SWMU 3**	**Dilute Industrial Wastewater Treatment Facility**	**Facility used to treat dilute industrial wastewater streams from the Main Street facility. Wastewaters contain oily wastes and dilute acids and alkalies. Unit is presently in operation.**
EU 4	**SWMU 4**	**Temporary Storage Containers**	**Storage containers consisting of 10-ton roll-offs water tight sludge containers. Sludge consisted of F006 sludge and filter cakes from treatment of dilute industrial wastewaters. Unit is presently in operation.**

NOTES:

EU = Environmental Unit

SWMU = Solid Waste Management UnitSWMU designation taken from a report by CGA Corporation for U.S. EPA, (1986)

FIGURES

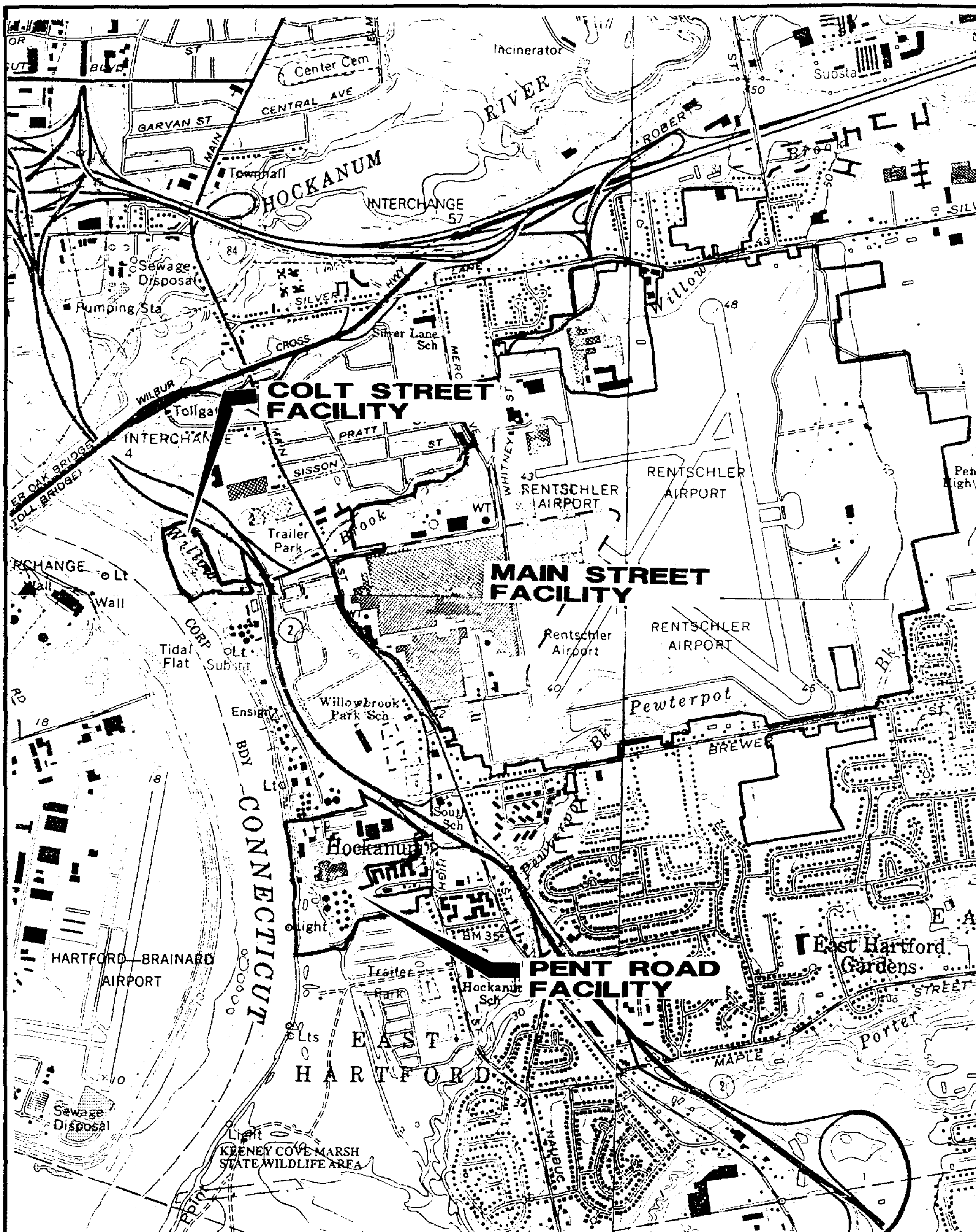


FIG. C-1

MAP REFERENCE:
USGS 7.5 MINUTE SERIES QUADRANGLES FOR HARTFORD NORTH, HARTFORD SOUTH, GLASTONBURY, AND MANCHESTER CONN., DATED 1964 & 1963 AND REVISED 1992.

1000 0 1000 2000 3000

SCALE IN FEET

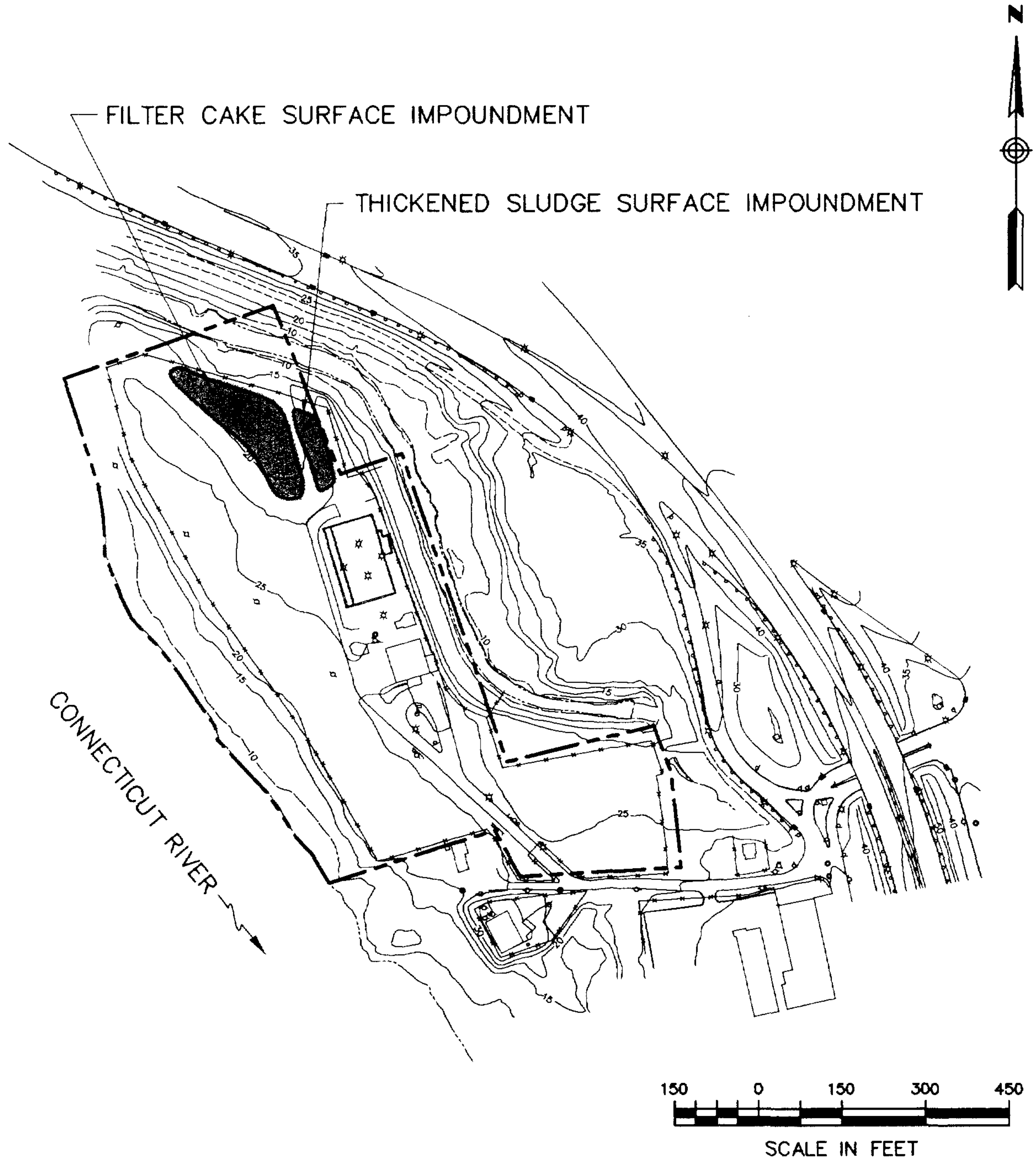
VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY COLT STREET FACILITY

USGS TOPOGRAPHIC MAP

Comm.No. 68VC601

Pratt & Whitney A United Technologies Company / LEA

VEH-FIGS (1)



LEGEND

Property line
(Approximate location)

FIG. C-2

VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY COLT STREET FACILITY

SITE PLAN

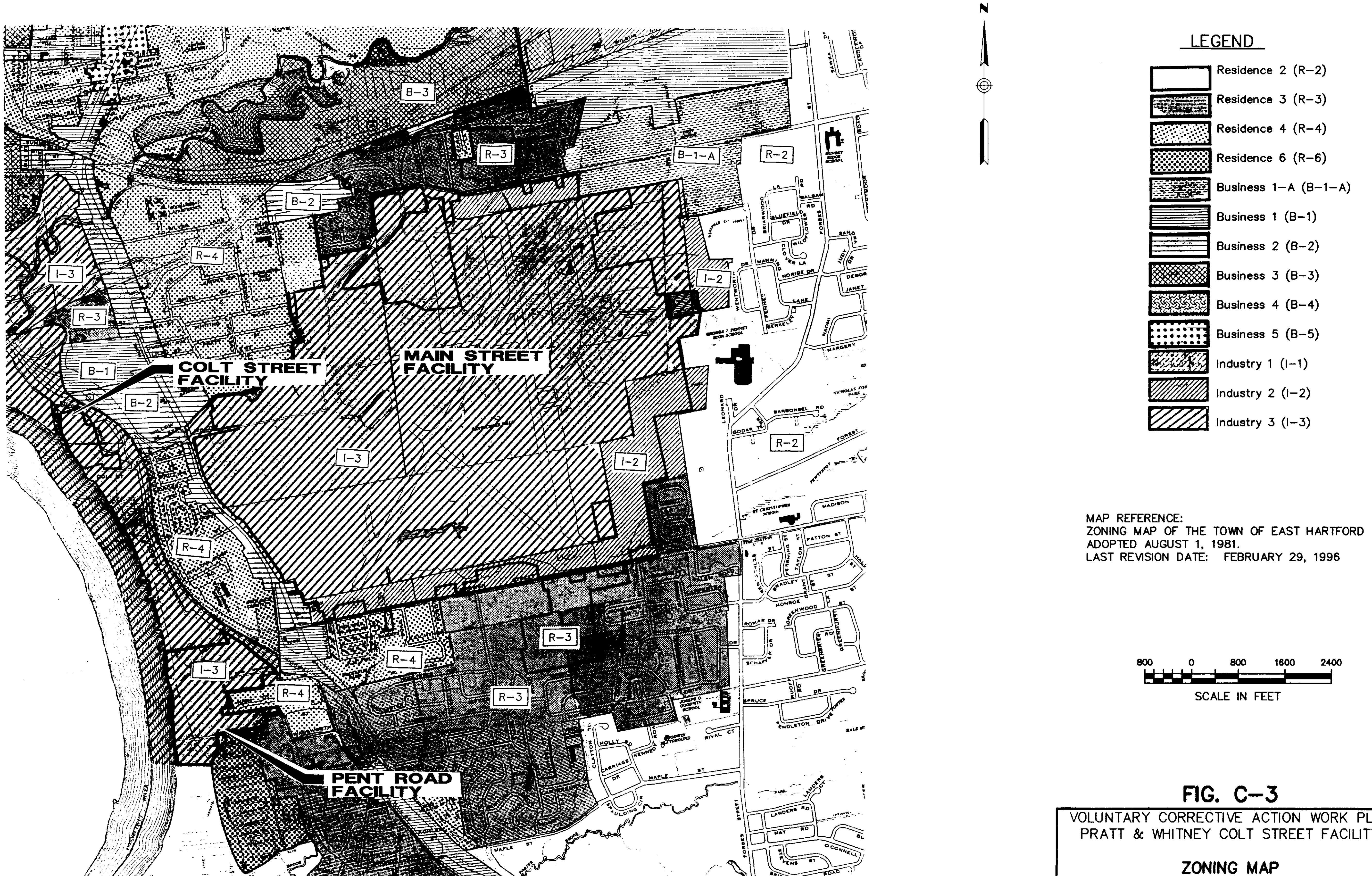
MAP REFERENCE:

SURVEY CONTROL BY FUSS & O'NEILL, INC
PHOTOGRAMMETRY BY
GOLDEN AERIAL SURVEYS, INC
DATE OF PHOTOGRAPHY: 3/17/91

Comm.No.
68VC601

Pratt & Whitney
A United Technologies Company
/LEA

VCS-FIG2 (300)



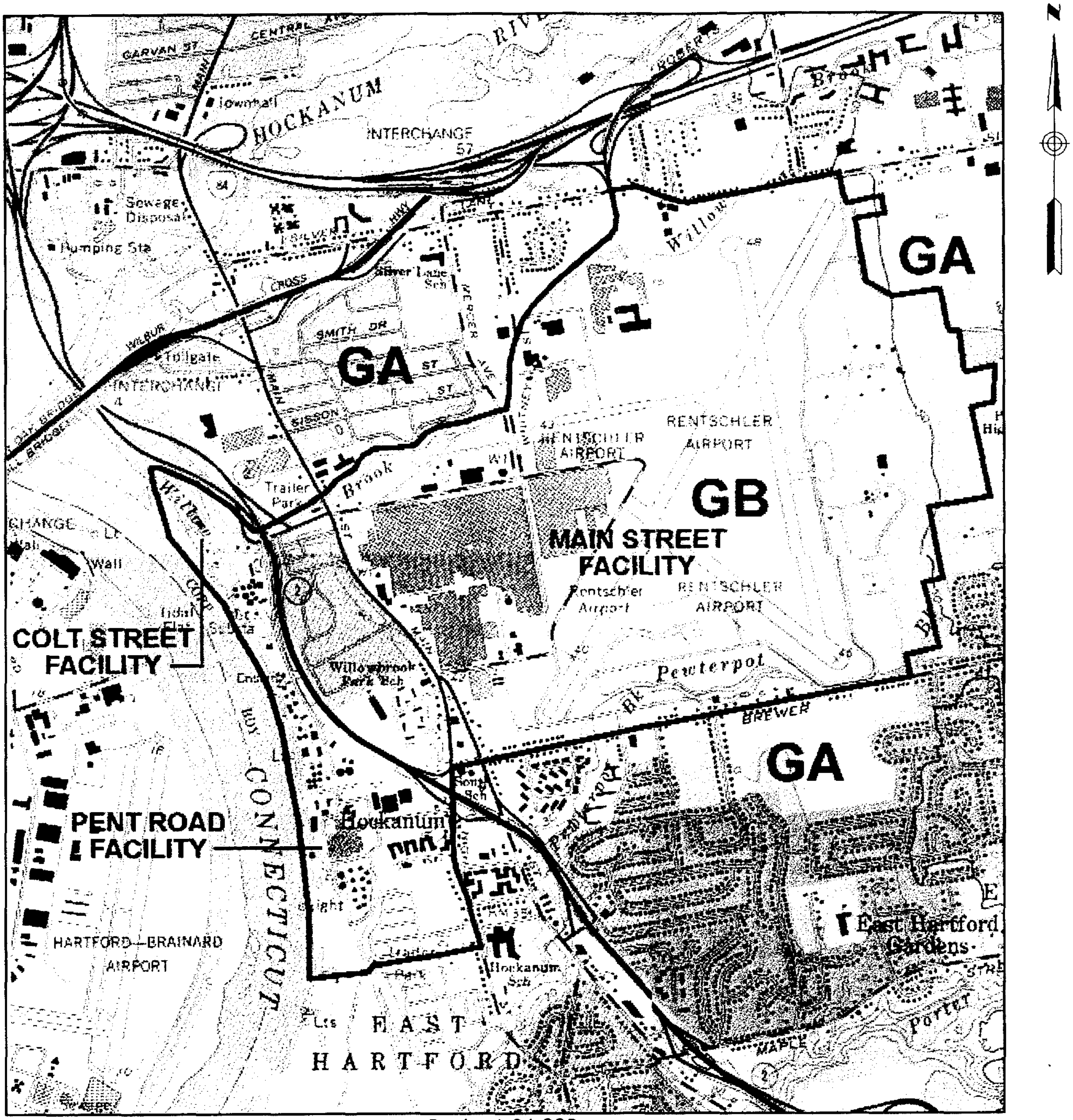
MAP REFERENCE:
ZONING MAP OF THE TOWN OF EAST HARTFORD
ADOPTED AUGUST 1, 1981.
LAST REVISION DATE: FEBRUARY 29, 1996

FIG. C-3

VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY COLT STREET FACILITY

ZONING MAP

Comm.No.	
68VC601	Pratt & Whitney / LEA



Scale: 1:24,000

NOTES:
Groundwater classifications from "ADOPTED WATER QUALITY CLASSIFICATIONS FOR THE CONNECTICUT RIVER BASIN: CTDEP, JUNE, 1988. Modified per groundwater classification, JUNE, 1996.

MAP REFERENCE:
USGS 7.5 MINUTE SERIES QUADRANGLES FOR HARTFORD NORTH, HARTFORD SOUTH, GLASTONBURY,AND MANCHESTER CONN., DATED 1964 & 1963 AND REVISED 1992.

1000 0 1000 2000 3000

SCALE IN FEET

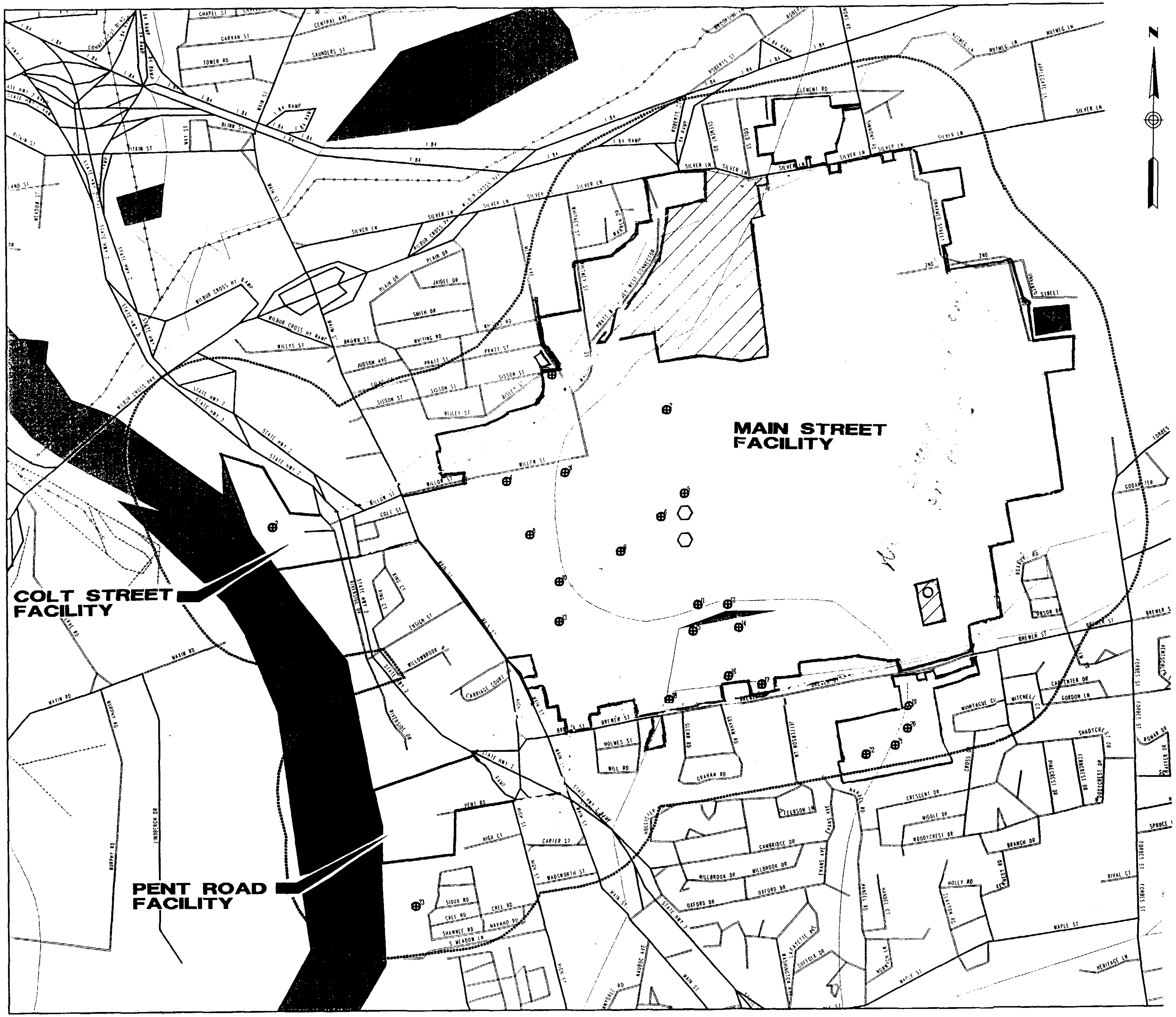
FIG. C-4

VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY COLT STREET FACILITY

GROUNDWATER CLASSIFICATIONS

Comm.No. 68VC601	Pratt & Whitney A United Technologies Company / LEA

VEH-FIGS (1)



LEGEND

⊕5 Well identified by EDR's Well search dated October 1996.

⬡ Public Well as reported in the "Atlas of the Public Water Supply Sources & Drainage Basins of Connecticut", dated June 1982. (abandoned)

○ Residential well (to be abandoned)

Property line (approximate location)

Search area based on approximate 1/4 mile buffer zone beyond property line.

Areas which are not part of the East Hartford Main Street Facility

MAP REFERENCE:
BASED ON DRAWING OBTAINED FROM ENVIRONMENTAL DATA RESOURCES, INC (EDR) AND FROM INFORMATION PRODUCED IN THE PUBLICATION ENTITLED, "ATLAS OF THE PUBLIC WATER SUPPLY SOURCES & DRAINAGE BASINS OF CONNECTICUT, DATED JUNE 1982.

0 1/8 1/4 1/2

Scale in Miles

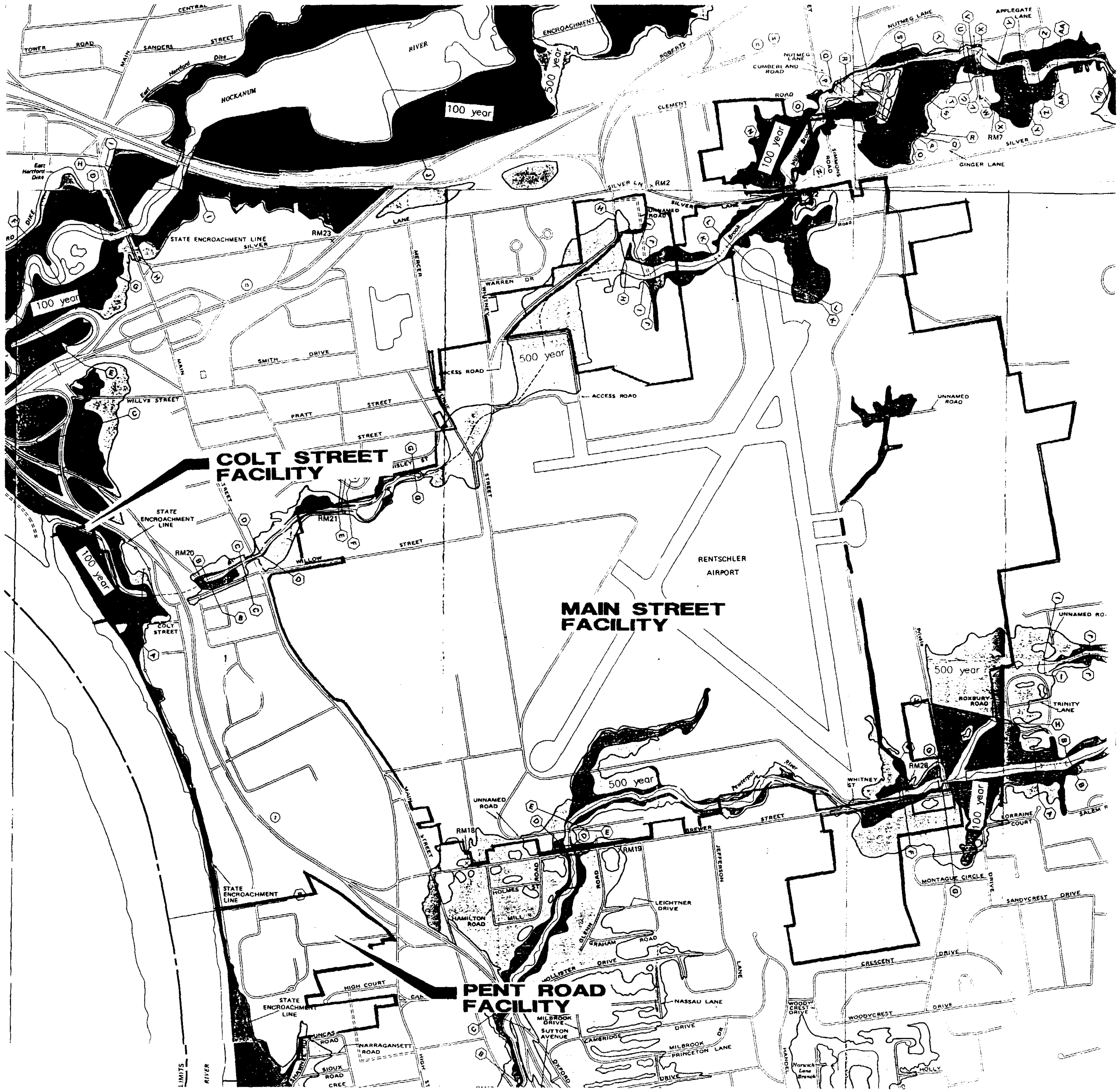
FIG. C-5

VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY COLT STREET FACILITY

WATER SUPPLIES

Comm.No. 68VC601	Pratt & Whitney A United Technologies Company / LEA

VEH-FIGS (1)



KEY TO MAP

- 500-Year Flood Boundary
- 100-Year Flood Boundary — 100 year
- FLOODWAY FRINGE — FLOODWAY
- 100-Year Flood Boundary
- 500-Year Flood Boundary — 500 year
- Approximate 100-Year Flood Boundary
- Cross Section Line — A — A
- Elevation Reference Mark — RM7×
- River Mile — •M1.5

APPROXIMATE SCALE
500 0 500 FEET

MAP REFERENCE:
BASED ON INFORMATION OBTAINED FROM THE FLOODWAY FLOOD BOUNDARY AND FLOODWAY MAP FOR THE TOWN OF EAST HARTFORD, CONNECTICUT, HARTFORD COUNTY, COMMUNITY-PANEL NUMBERS 090026 0001-0004, PANELS 1, 2, 3 & 4 OF 4, MAP REVISED: OCTOBER 23, 1981.

FIG. C-6

VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY COLT STREET FACILITY

FLOODPLAIN MAP

Comm.No. 68VC601	Pratt & Whitney A United Technologies Company / LEA

APPENDIX D
NORTH HAVEN FACILITY DESCRIPTION
NORTH HAVEN, CONNECTICUT

NOVEMBER 22, 1996

Prepared By:

PRATT & WHITNEY
400 Main Street
East Hartford, Connecticut

In Association With:

LOUREIRO ENGINEERING ASSOCIATES
100 Northwest Drive
Plainville, Connecticut

LEA Comm. No. 68VC601

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FIGURES

TABLES

D1. SITE LOCATION AND DESCRIPTION

The Pratt & Whitney North Haven facility is located at 415 Washington Avenue in North Haven, Connecticut. The facility is located between Washington Avenue to the east and the Quinnipiac River to the west, and is bordered by residential and commercial/industrial properties to the north. To the south and west the property is bordered by undeveloped land. Immediately to the east, the property is bordered by the Boston and Maine Railroad. The facility consists of a 1,200,000-square foot main factory building, a power house, and several ancillary structures on approximately 160 acres of land. The location of the site is shown on Figure D-1, and a schematic illustration of the facility layout is shown on Figure D-2. The facility is used for the manufacture and testing of jet engine components.

D1.1 Site and Use and Ownership

The current facility location was the site of a hog farm until 1952, when it was purchased by Pratt & Whitney. The first 600,000 square feet of the main factory was constructed in 1952. The remaining 600,000 square feet of the main factory, located to the south of the original structure, was constructed in 1956.

D1.2 Review of Published Information

D1.2.1 City Directory Search

LEA contracted with Environmental Data Resources, Inc. (EDR) to review city directories at approximately five-year intervals for North Haven for the years 1930 through 1983. The purpose was to identify references to the North Haven facility location and surrounding properties. From 1930 until 1963, there was no listing for the site in the Price & Lee's City Directory. EDR reported in the 1963 Price & Lee's City Directory, the site was listed as the Park Plaza Shopping Center. It is unclear whether this is simply an error or whether this listing refers to a site along Washington Avenue between the Boston and Maine Railroad and the street. In 1983, the site was listed in Johnson's City Directory as being occupied by the following: East Hartford Aircraft Federal Credit Union; New Frontiers Medical Associates; Pratt & Whitney Aircraft; and, Pratt & Whitney Federal Credit Union. In the surrounding area, a number of commercial, industrial, and residential entities were identified, beginning in 1951.

D1.2.2 Fire Insurance Map Review

No fire insurance maps were found for the North Haven facility.

D1.2.3 Topographic Map Review

The Pratt & Whitney North Haven site is located on the United States Geologic Survey topographic map of the Wallingford, Connecticut quadrangle. LEA contracted with Environmental Data Resources, Inc. (EDR) to search for historical topographic maps of the area; EDR was able to locate four historic topographic maps of the Wallingford quadrangle. The maps are from the years 1954, 1967, 1972, and 1984. The 1954 topographic map shows the facility at the site, but at about one half the size of the present structure. In general, the remaining maps show the facility at approximately the present size, with only minor additions evident. The surrounding areas show a general increase in development, both residential and commercial.

D1.2.4 Aerial Photograph Review

Aerial photographs of the site were not reviewed as a part of preparation of this work plan. The survey of available historic aerial photographs indicated that the oldest available photograph from readily available sources was from 1951. A color infrared photograph was reported to be available from 1986. The exact sources of the photographs are unknown; however, the photographs are available through National Aerial Resources, Inc.

D2. ENVIRONMENTAL SETTING

D2.1 Land Use

The site consists of approximately 160 acres of land situated between Washington Avenue to the east, and the Quinnipiac River to the west. The site includes the main factory building, a power house, a dilute industrial wastewater treatment facility, and several ancillary structures, along with paved parking and covered storage areas. There is approximately 35 feet of topographic relief on the site, ranging from approximately 10 feet above mean sea level (MSL) at the Quinnipiac River to approximately 45 feet MSL near the main factory building.

A zoning map for the facility is presented in Figure D-3. The facility has a classification of L-80 and is surrounded by residential (west of the river), industrial (to the south and north of the facility) and a mixture of industrial, commercial and residential properties (to the east of the facility)

D2.2 Groundwater and Surface Water Classification

The DEP has adopted water quality classifications for the groundwaters and surface waters of the State to categorize the existing quality of the water, the potential uses of the water, allowable discharges to the water, and the long-term State goals for water quality restoration. Surface waters and groundwaters are classified separately, and both classification schemes are based on the water quality standards adopted by the DEP.

The surface water classification of the Quinnipiac River in the vicinity of the North Haven facility is C/B. A classification of C indicates that the present water precludes full attainment of one or more designated uses for class B waters. Class C waters may be suitable for certain fish and wildlife habitat, certain recreation activities, industrial uses, and other legitimate uses including navigation. As indicated by the "/B" notation, the State's long term goal for these waters is attainment of Class B water quality. Class B surface waters are suitable for recreational uses, fish and wildlife habitat, agricultural and industrial supply, and other legitimate uses including navigation.

Groundwater quality in the area of the site has been classified as GB by the DEP. A classification of GB indicates that the groundwater is known or presumed to be affected in quality by historic waste disposal sites or by historic intense urban, commercial and industrial development. A copy of the water quality classification map is included as Figure D-4.

D2.3 Water Supplies

A well search performed by EDR revealed the presence of several wells within the general area of the site as noted in Figure D-5. Among the wells identified are the on-site water supply wells, used by Pratt & Whitney solely for process water. Five of the on-site production wells are located along the northern property border; the sixth production well is located near the Quinnipiac River towards the southwestern corner of the property. The area is supplied by municipal drinking water.

D2.4 Floodplain Information

Part of the site is located within the 100-year floodplain of the Quinnipiac River. That portion of the site is the area within approximately 200 to 1,000 feet of the Quinnipiac River (as shown on Figure D-6). None of the hazardous waste storage areas of the facility are situated within the 100-year flood plain.

D2.5 Surface Water Drainage

Surface waters from the site that are not contained in the storm water drainage system drain to the Quinnipiac River. Most of the upper terrace portion of the site, however, is paved and storm drains direct storm runoff. Runoff from the vicinity of the manufacturing facility is directed to an unnamed brook, which itself discharges to the Quinnipiac River.

The stormwater runoff collected in the on-site storm drains was directed to the industrial wastewater treatment plant through the X-, Y-, and Z-drains, which were originally intended to discharge storm water, dilute industrial wastewater, and non-contact cooling water directly to the X-, Y-, and Z-streams, respectively. In 1972, after construction of the dilute industrial wastewater treatment plant, the drain outfalls were manifolded together and directed to the wastewater treatment plant. Because of the possibility of heavy storms overloading the storm sewer system, junction boxes were installed at the X, Y, and Z drain outfalls to re-direct excessive storm waters to the three streams. Stormwater from the X,Y and Z outclass are no longer treated at the industrial wastewater treatment plant. The three streams flow through a wetlands area before discharging into the Quinnipiac River under an NPDES Permit.

D2.6 Regional Geology

The Pratt & Whitney North Haven facility is located in the Central Lowland physiographic province. The general vicinity of the site is underlain by glacial outwash deposits consisting of gravel, sand, and silt. These were deposited by meltwater streams emanating from the retreating glacier during the most recent glacial period, which ended approximately 10,000 years ago. To the west of the site are post-glacial terrace deposits and recent alluvium, consisting of gravel, sand, silt, and clay, associated with the Quinnipiac River. These recent deposits overlie the glacial sediments in areas where both are present.

Bedrock geology in the vicinity of the site is composed of Triassic-age sedimentary rocks consisting of conglomerates, arkoses, sandstones, siltstones, and shales. The individual sedimentary formations are interbedded with basaltic lava flows. The general dip of the bedrock is to the east or southeast towards the Eastern Border fault, located approximately eight to nine miles to the east of the site.

D2.7 Site Geology

The surficial materials directly beneath the North Haven facility were mapped by the U.S. Geological Survey as "made land". However, surficial materials in the general vicinity of the facility (and presumable present beneath the site) have been mapped as valley train deposits. Valley train deposits are sediments deposited by streams in a pro-glacial valley. The deposits have been described as yellowish gray, pebble gravel, sand, and silt derived mainly from crystalline rocks of the Western Uplands. In the vicinity of the site, these deposits are reportedly composed primarily of medium sand.

Site geology has been further defined during site investigations. The unconsolidated deposits on the site have been differentiated into three units. The upper most unit consists of brown to red, fine to medium sand with some to trace quantities of gravel and little silt. The intermediate unit is composed of red and brown silt and clay. A lower sand unit is present beneath the silt and clay. A basal till layer was also reported in some soil borings.

Bedrock beneath the facility has been mapped as the New Haven Arkose. The New Haven Arkose consists of reddish-brown conglomerates, sandstones, and siltstones. The rocks dip generally to the southeast towards the border fault.

D2.8 Regional Hydrogeology

Regional hydrogeology is controlled by the Quinnipiac River and the geometry of the unconsolidated valley fill materials. Regional groundwater flow would be expected to be generally toward the south. Local groundwater flow would be influenced, however, by local geologic and topographic anomalies and anthropogenic features, such as water wells.

D2.9 Site Hydrogeology

The site hydrogeology has been interpreted from soil borings and on-site monitoring wells as consisting of four distinct zones within the unconsolidated aquifer. These zones are related to the upper sand unit; the silt/clay layer; the lower sand unit; and the northwest corner of the site where the silt/clay layer is absent and the lower and upper sand units combine. The silt/clay layer, where present, acts as a semi-confining layer.

Groundwater flow in the upper aquifer, as interpreted from water levels measured in the on-site monitoring wells, is from east to west. There are, however, local inconsistencies due to groundwater withdrawal from the production wells, and the absence of the silt/clay layer in the vicinity of the production wells. Regional groundwater flow in the lower aquifer is presumed to be from north to south; however, the flow pattern on the Pratt & Whitney site is generally controlled by pumping of the production wells.

D3. WASTE MANAGEMENT

D3.1 Facility Operations

The North Haven facility primarily engages in manufacturing processes and experimental testing for engine parts and assemblies for aircraft engines and spare engine parts (SIC Code 3724). Manufacturing of engines and engine parts involves a variety of metal processing operations. Many of these operations are unique due to the light weight alloys needed to produce jet engines.

Typical operations include forming, machining, heat treating, welding, application of protective coatings, non-destructive testing, bonding, chemical cleaning, abrasive cleaning, chemical stripping, pickling, anodizing and nickel, plating.

D3.2 Waste Generation, Handling, and Characteristics

A variety of wastes are (or were) generated as a result of manufacturing, testing maintenance, and remediation activities conducted on-site. These wastes include water solutions (both concentrated and dilute which contain acids, alkalies, and heavy metals), spent solvents, waste oils, F006 sludge from cleaning the on-site dilute wastewater treatment system, and laboratory chemicals. Non-contact cooling waters and treated dilute industrial wastewaters are discharged to the Quinnipiac River under an NPDES permit. Hazardous wastes are accumulated and stored on-site for less than 90 days while awaiting shipment for off-site disposal. Many of these wastes are disposed of by vendors who utilize various methods including, but not limited to, incineration, wastewater treatment, fuel blending, distillation, fuel burning for energy recovery, chemical fixation, landfilling, solvent extraction and deactivation procedures. Wastes shipped to the Pratt & Whitney Main Street facility include acids, alkalies, and oils. Other wastes such as scrap metals are recycled, or solid non-hazardous wastes are disposed of at municipal landfills and incineration.

- **Acids**

Pratt & Whitney uses several acids in its production processes. The resulting acid wastes are spent acid-water solutions of varying concentrations. Acid wastes are pumped out of process tanks and into transporters and 55-gallon drums until the waste is shipped to the

Pratt & Whitney East Hartford CWTP for treatment. Waste nitric acid is stored in a 6,000-gallon trailer for less than 90 days and shipped weekly to Pratt & Whitney East Hartford. Dilute acid rinsewaters flow to an NPDES-permitted dilute wastewater treatment system.

- **Alkalies**

Pratt & Whitney uses several alkalies in its production process. The resulting alkali wastes are spent alkali/water solutions of varying concentrations. Alkali wastes are pumped out of process tanks and into transporters or drums until the waste is transported to East Hartford for neutralization. Dilute alkali rinsewater from rinse ranks flows to an NPDES permitted dilute wastewater treatment system for metal removal and neutralization.

- **Chromium**

Pratt & Whitney used several chromium compounds in the production process. The resulting chromium wastes were spent chromium/water solutions of varying concentrations. Dilute chromium wastes were treated by chemical reduction, after which the treated solution flowed to the NPDES permitted dilute wastewater treatment plant for metal removal, neutralization, and gravity settling, Concentrated chromium wastes were shipped to the Pratt & Whitney Main Street facility for treatment.

- **Cyanide**

Pratt & Whitney used cyanide solutions in the production process. The resulting cyanide wastes were spent cyanide/water solutions of varying concentrations and spent plating bath solutions containing copper and cadmium. Cyanide waste solutions were shipped to the Pratt & Whitney Main Street facility for disposal. Dilute cyanide rinsewaters from rinse tanks were pretreated by chemical oxidation after which the treated solution flowed to the NPDES permitted dilute wastewater treatment system for metal removal and neutralization.

- **Wax/Solvents and Oil/Solvents**

Pratt & Whitney used solvents in degreasing operations, generating a waste wax/solvent or oil/solvent mixture. Most solvents are reclaimed by distillation in the plant. The sludges and still bottoms are shipped to the Pratt & Whitney Main Street facility for storage and disposal.

- **Solvents**

Pratt & Whitney used solvents in degreasing, cleaning, and laboratory operations, generating spent solvent wastes which are shipped to the Pratt & Whitney Main Street facility for disposal. The solvents tetrachloroethylene, trichlorotrifluoroethane, and 1,1,1-trichloroethane are reclaimed by distillation in the plant.

- **Paints and Paint Wastes**

Pratt & Whitney uses paints and the associated paint solvents in industrial and facility painting operations. Waste paints and paint solvents are disposed of by incineration by a permitted commercial TSDF.

- **Sludges and Waste Solids**

Pratt & Whitney operates an electroplating wastewater treatment plant which produces a metal hydroxide filter cake which is a listed hazardous waste (F006). This sludge is disposed of in a permitted TSDF. In addition, Pratt & Whitney produces two hazardous waste solids, one from a shaft boring operation and one from a metal coating operation. Both of these solids are also picked up by private waste haulers for disposal and/or reclamation.

- **Laboratory Chemical and Commercial Chemical Products**

Pratt & Whitney has laboratory facilities which produce waste laboratory chemicals, and Pratt & Whitney purchases many commercial chemical products for use in its plants. These items become waste products through obsolescence or expired shelf life, and are disposed in a secure chemical landfill by a commercial TSDF.

D3.3 Waste Disposal Practices

Wastes that are not treated in the on-site wastewater treatment facility are manifested off-site to the Pratt & Whitney Main Street facility in East Hartford, Connecticut. Pre-treated wastewaters from the plating operations and storm water collected in the X- Y- and Z-drains were treated in the wastewater treatment facility on-site. Acid and alkali wastewaters are transferred to the treatment facility through underground piping from the main facility. At the wastewater treatment facility, polymer and lime are added to the wastewaters to raise the pH and cause flocculation. After flocculation, the pH is lowered, and the consistency of the effluent is thickened to that of a paste. As a final step, a vacuum filter extracts the sludge and deposits it in a dumpster. The sludge is then manifested to a RCRA-permitted TSDF. Water from the treatment system is discharged to an unnamed brook under NPDES permit.

D4. SUMMARY OF EXISTING CONDITIONS

D4.1 Regulatory Status

The information presented in this report is a summary of information gathered from a variety of sources, including the files of the DEP, federal database searches, reviews of the facility's RCRA Part A and Part B applications, historical topographic maps, aerial photographs, fire insurance maps, and city directory searches.

The facility is regulated under RCRA, the Clean Air Act, and the NPDES regulations. The facility filed a RCRA Part A permit on October 21, 1986, and a RCRA Part B Permit on November 8, 1988. The facility also has an NPDES permit for the discharge of treated water from the on-site dilute industrial wastewater treatment system, and stormwater into the X-stream outfall. The facility maintains air emission permits to operate the boiler and the spray coating lines. The EPA ID number for the facility is CTD001449511.

The Pratt & Whitney North Haven facility was listed on the following federal and State databases: Facility Index System (FINDS); Resource Conservation and Recovery Information System (RCRIS); Toxic Release Inventory System (TRIS); Connecticut State Underground Storage Tank listings (UST); the Connecticut State Hazardous Waste Sites (SHWS) listing; and the federal No Further Remedial Action Planned (NFRAP) listing.

In the RCRIS database, the facility was listed as both a large quantity generator and a treatment, storage, disposal facility (TSDF). The Connecticut UST database indicates that there are presently two active USTs at the facility. These two tanks were removed in 1995. The database also listed 11 USTs that have been removed from the site. In the SHWS database, the site was listed as having discharged metal hydroxide sludge and solvents to the ground. Information contained in the database indicates that the activity was terminated in 1978, and the contaminated soil was reported to have been removed by 1986. The site was listed in the NFRAP database, as a former CERCLIS listing, with discovery completed on June 30, 1988. The Preliminary Assessment was completed on December 8, 1989.

In its August 13, 1980, notification of hazardous waste activity report, the facility was listed as a generator; transporter TSDF, and an underground injector of hazardous waste (because of the surface impoundments). Pratt & Whitney submitted a RCRA Part A Permit Application on August 18, 1980, indicating that hazardous wastes were stored in two surface impoundments (10,500-cubic yards total capacity), in containers, and, in an 8,000-cubic yard waste pile.

Pratt & Whitney began using surface impoundments to receive sludge from the wastewater treatment plant from 1972 until 1978. In 1978, a vacuum filter system was installed and the impoundments were no longer used, but sludge was stored in stockpiles near the impoundments from 1978 until 1982.

A closure plan for the impoundments was submitted to the DEP in February 1985. The surface impoundments were certified clean-closed by a professional engineer in October 1985. A RCRA Part B Permit Application for the facility was submitted in November 1988 and a RCRA Post Closure Part B Permit Application in December 1991. No response has been received as of this date.

D4.2 Known Releases

A direct review of the reported releases from the facility was not conducted. A review of the State of Connecticut Oil & Chemical Spills database revealed 98 reported spills for the facility. None of the reported releases contained specific information regarding the spill. Two spill reports were included in the RCRA Part B Permit application: a 55-gallon #6 fuel oil spill from January 22, 1986, and an undetermined amount of chromium, 1,1,1-trichloroethane, perchloroethylene, and trichloroethylene from leakage at the plating line trenches (chromium) and the oil/solvent house pump drain (volatile organic compounds). A review of the Oil & Chemical Spills files available at the DEP suggests that between 100 and 200 additional spill reports are contained in the facility files.

D4.3 Facility Investigations

Various investigations have been conducted at the facility. The reports prepared through April 1993 are summarized in Table D-1. A "pro-active" corrective action program has been established which has identified several solid waste management units (SWMUs) and areas of concern (AOCs). Some investigation has been initiated on nearly all of the

SWMUs and AOCs and some remedial actions have taken place. For example, one degreaser pit recently investigated was found to have solvent contamination of the subsurface soils. A soil vapor extraction system was installed to address the conditions identified, and has proven to be quite effective at removing the contaminants.

D4.4 Identification of Environmental Units

During a visual site inspection (VSI) conducted on May 23 and 24, 1989, personnel and representatives from the EPA identified 37 Areas of Concern (AOCs) at the facility. Some of the AOCs may represent solid waste management units (SWMUs). A listing of the 37 AOCs identified by the EPA is presented in Table D-2 along with a brief description of each unit. The identified AOCs have been re-numbered as Environmental Units for the purposes of the VCAP. These AOCs were previously identified and investigated during various investigations under a separate SWMU/AOC list.

D4.5 Remediation Activities

Various remediation activities have taken place at the facility. These activities have focused on three areas of the site: soil contamination in the area of a former vapor degreasers; closure of the former surface impoundments and waste piles; and volatile organic compounds (VOCs) in the former tank farm.

Volatile organic compounds were identified in the soil near former degreasers, identified as degreasers F-47, and E-61, in the facility. Soil vapor extraction (SVE) systems were installed in the area of the former degreaser pits to remediate the soils.

The former surface impoundments were certified clean-closed by a professional engineer in October 1985. An emergency at the on site wastewater treatment facility, however, necessitated the re-use of a portion of the surface impoundments in March 1985. A groundwater monitoring program has been in effect at the former impoundments since December 1985. No contaminants from the surface impoundments have been detected; however, chromium and volatile organic compounds from an upgradient source have been identified.

Previous investigations at the former tank farm (AOC #17) identified DNAPL in the groundwater and soil. A containment cell was constructed to isolate the DNAPL-contaminated source area. This containment cell is now the subject of a DNAPL remediation research project. The project began in June 1996 and is being conducted jointly by Pratt & Whitney, United Technologies Corporation (UTC), United Technologies Research Center (UTRC), the University of Connecticut's Environmental Research Institute (UConn ERI), and the University of Waterloo Centre for Groundwater Studies. The intent of the four-year remediation research project is to assess the effectiveness of various field treatability technologies for DNAPL remediation at actual industrial sites with similar hydrogeological conditions.

TABLES

Table D-1

List of Environmental Reports
Pratt & Whitney North Haven Facility

Year	Report Title and Author
1965	North Haven Groundwater Study (P&W East Hartford, Dec 1965)
1966	Investigation of Ground-Water Conditions at Pratt & Whitney Division of United Aircraft, Inc., North Haven Plant, CT. (G&M, July 1966)
1967	Results of Test Drilling and Well Inspection at the Pratt & Whitney Aircraft, North Haven, CT. (B&M, July 1967) Installation and Testing of Production Well 6, Pratt & Whitney Plant, North Haven, CT. (G&M, July 1967)
1985	Closure Plan For Existing Surface Impoundments and Waste Piles at Industrial Waste Treatment Facility, Pratt & Whitney North Haven, CT. EPA ID CTD001449511 (LEA, Feb 1985). Pratt & Whitney Investigation of Solvents Storage Areas (GZA, June 1985) Ground Water Quality Assessment Program, United Technologies, Pratt & Whitney, North Haven, Connecticut (GZA, April 1985). Supplement to RCRA Closure Plan for Surface Impoundments and Waste Piles, Pratt 7 Whitney North Haven Facility, EPA ID CTD001449511 (LEA, Sept 1985). Response to Corrective Action Information Request at Pratt & Whitney, Washington Avenue, North Haven, CT. EPA ID #CTD001449511. (LEA, Sept. 1985). Site Assessment for Surface Impoundments, Pratt & Whitney North Haven
1987	Phase II Site Assessment, Pratt & Whitney North Haven Facility, North Haven CT. (GZA, Jan 1987) Closure Plan For The Surface Impoundments and Waste Piles at Industrial Waste Treatment Facility, Pratt & Whitney, North Haven, CT. EPA ID CTD001449511. Vol. 1 and 2 (LEA, Jan 1987) Revised Response to Corrective Action Information Request at Pratt & Whitney, Washington Avenue, North Haven, CT. EPA ID #CTD001449511. Vol. I and II (LEA, Dec 1987).
1988	Phase III Groundwater and Surface Water Assessment, Pratt & Whitney, North Haven Facility, North Haven, CT. (GZA, July 1988).

Table D-1

List of Environmental Reports
Pratt & Whitney North Haven Facility

Year	Report Title and Author
1989	Final Report Contaminated Soil Investigation and Remediation Oversight for Tank Removal Excavations, Pratt and Whitney Aircraft, North Haven , CT. (LEA, Jan 1989) Plating Line Evaluation, Pratt & Whitney Aircraft, North Haven, CT. (F&O, Mar 1989). Vadose Zone Soil Quality Soil Quality Assessment, Former Tank Field/Oil Pump House, Pratt & Whitney Aircraft, North Haven, CT. (F&O, May 1989).
1990	Nickel Repair & Strip Line Investigation, Pratt & Whitney Aircraft, North Haven, CT. (F&O, February 1990 draft). Plating Lines Investigation, Pratt & Whitney Aircraft, North Haven, CT. (F&O, March 1990 **draft**). Soil Gas Survey, Building Exterior, Pratt & Whitney, North Haven, CT. (F&O, May 1990, Revised May 1992). Drilling and Sampling Protocols, Pratt & Whitney Aircraft, North Haven, CT. (F&O, November 1990). Soil Gas Survey, Building Interior, Pratt & Whitney, North Haven, CT. (F&O, November 1990. Revised April 1992). Geophysical Investigation, Pratt & Whitney Aircraft, North Haven, CT. (F&O, December 1990).

Table D-1

List of Environmental Reports
Pratt & Whitney North Haven Facility

Year	Report Title and Author
1991	1990 RCRA Ground-Water Monitoring Annual Report, Former Surface Impoundment Area, Pratt & Whitney Aircraft, North Haven, CT. (F&O, February 1991). Revised RCRA Ground-Water Assessment Program, Former Surface Impoundment Area, Pratt & Whitney Aircraft, North Haven, CT. (F&O, March 1991). Soil and Sediment Investigation, "X", "Y", and "Z" Drain Outfalls, Pratt & Whitney Aircraft, North Haven, CT. (F&O, March 1991 **Draft**). Health and Safety Plan, Subsurface Investigations, Pratt & Whitney Aircraft, North Haven, CT. (F&O, April 1991). Hydrogeologic Parameter Testing Investigation, Pratt & Whitney Aircraft, North Haven, CT. (F&O June 1991). Preliminary Facility-Wide Integrated Surface and Ground-Water Monitoring Program, Pratt & Whitney Aircraft, North Haven, CT. (F&O, June 1991). Results of Subsurface Investigation, Former Degreaser F-47, Pratt & Whitney Aircraft, North Haven, CT. (F&O, October 1991). Phase I RCRA Facility Investigation Proposal, Working Copy, Latest Revision - November 1991, Pratt & Whitney Aircraft, North Haven, CT. (F&O, November 1991). Soil Gas Survey, Power House, Pratt & Whitney Aircraft, North Haven, CT. (F&O, November 1991 **Draft**). Characterization of Materials at Former Sanitary Waste Treatment Plant, Pratt & Whitney, North Haven. (F&O letter report dated November 6, 1991). Comprehensive Surface Water and Ground-Water Sampling Event (June 1991), Pratt & Whitney Aircraft, North Haven, CT. (F&O, December 1991 **Draft**). Post-Closure Part B application, Pratt & Whitney Aircraft, North Haven, CT. (F&O, December 1991). Soil Quality Screening Investigation, Former Fire Training Area, Pratt & Whitney Aircraft, North Haven, CT. (F&O, December 1991 **Draft**). Aquifer Characterization and Conceptual Ground-Water Remedial Evaluation, Pratt & Whitney Aircraft, North Haven, CT. (F&O, December 1991 **Draft**).

Table D-1

List of Environmental Reports
Pratt & Whitney North Haven Facility

Year	Report Title and Author
1992	Subsurface Investigation Results, Former Degreaser Pit E-61, Pratt & Whitney, North Haven, CT. (F&O letter report dated January 18, 1992). 1991 RCRA Ground-Water Monitoring Annual Report, Former Surface Impoundment Area, Pratt & Whitney Aircraft, North Haven, CT. (F&O, February 1992). Engineering Report to the North Haven Wetlands Commission for the Closure of a Former Surface Impoundment Area, Pratt & Whitney Aircraft, North Haven, CT. (F&O, February 1992). Facility-Wide Surface Water and Ground-Water Sampling Event (September 1991), Pratt & Whitney Aircraft, North Haven, CT. (F&O, February 1992 **Draft**). A Compendium of Plating Line Investigations Conducted for the Pratt & Whitney - North Haven Facility. (F&O, October 1992). Second Quarter 1992, Facility-Wide Surface Water and Groundwater Sampling Event. Pratt & Whitney, North Haven, Connecticut. (F&O, November 1992). Former Tank Farm Area (AOC #17) Investigation. Pratt & Whitney, North Haven, Connecticut. (F&O, November, 1992 **Draft**). Closure Plan For Former Soil Stockpile Area, Pratt & Whitney, North Haven, Connecticut. (F&O, December, 1992).
1993	Groundwater Flow Modeling for the Simulation of Shallow Groundwater Extraction Scenarios, Pratt & Whitney, North Haven, Connecticut. (F&O, March 1993). 1992 RCRA Groundwater Monitoring Annual Report, Former Surface Impoundments Area, Pratt & Whitney, North Haven, Connecticut EPA ID001449511. (F&O, March, 1993). Cone Penetrometer Survey, Pratt & Whitney, North Haven, Connecticut. (F&O, April 1993).

Table D-2
IDENTIFICATION OF ENVIRONMENTAL UNITS
North Haven Facility
North Haven, Connecticut

EU ID	SWMU/ AOC ID	EPA's PA AOCs ID	Name	Description
EU 1	SWMU 12	AOC #1	Hazardous Waste Transporter Storage Area	Four bermed storage areas. The area is inactive but staining was reported (CDM, 1991)
EU 2	AOC 14	AOC #2	Wooden Floor Blocks/Roofing Area	Floor block treating and roofing tar management area. Staining has been reported (CDM, 1991)
EU 3	None	AOC #3	1,000-Gallon Fuel Oil Treatment Tank	Former 1,000-gallon underground fuel oil treatment tank. Stained soil space and stressed vegetation have been reported (CDM, 1991)
EU 4	AOC 16	AOC #4	No. 6 Fuel Oil Spill and Soil Pile	Contaminated soil from #6 Fuel Oil UST tank removal formerly stockpiled in this area.
EU 5	SWMU 2	AOC #5	Waste Nitric Acid Transport Tanker	Transport tanker for waste nitric acid with and permanent unused nitric acid storage tanks. Total volume is 6,000 gallons for waste nitric acid and 4,500 gallons for unused nitric acid solutions. The area was first used in 1974.
EU 6	None	AOC #6	Water Tower Stain	Blackened soil and vegetation noted by EPA personnel in 1989 (CDM, 1991).
EU 7	AOC 17	AOC #7	Former Underground Storage Tank Farm	Eight underground storage tanks for hydraulic oil, Zyglo oil, cutting oil, diesel fuel, and gasoline and one vaulted fan UST for 1,1,1-trichloroethane. The area was first used in 1952, and all of the tanks were removed in 1988. Two 2,500 gallon, double-walled fiberglass tanks were later installed to store gasoline and diesel fuel (CDM, 1991).
EU 8	AOC 17	AOC #8	Former Oil/Solvent Pump House	Formerly used to pump oil and solvents from the former underground tank farm (EU 9). This unit was demolished in 1988.
EU 9	AOC 15	AOC #9	Wastewater Pre-treatment Plant	This unit pre-treats chromium, cyanide, acid and alkali wastes before transfer to the wastewater treatment plant.
EU 10	SWMU 1	AOC #10	Present Drum Storage Area	This unit is built over the former drum storage area. This unit is used for the storage of 55-gallon drums.

Table D-2
IDENTIFICATION OF ENVIRONMENTAL UNITS
North Haven Facility
North Haven, Connecticut

EU ID	SWMU/ AOC ID	EPA's PA AOCs ID	Name	Description
EU 11	None	AOC #11	Temporary Drum Storage Area - 1988	The temporary drum storage area was used in 1988 while the existing hazardous waste and hazardous materials storage area was being constructed. The area is asphalt-paved. During a VSI in August 1989, staining and partial dissolution of the asphalt was noted.
EU 12	SWMU 1	AOC #12	Hazardous Waste and Hazardous Materials Storage Area	This unit consists of a covered storage building built over a former drum storage area. Releases from the former storage area sump have been recorded (CMD, 1991).
EU 13	SWMU 1	AOC #13	New Bulk Oil Storage Building	This unit was constructed in 1988 over the western section of a former drum storage area. This unit consists of eight 10,000-gallon aboveground storage tanks used to store tetrachloroethylene, hydraulic oil, grinding oil, waste soluble oil, and non-reclaimable waste oil. There were no known releases from this unit as of 1991; however, there were documented releases from the former units at this location (CDM, 1991).
EU 14	SWMU 13	AOC #14	Waste Pile Storage Area	This area was used in late 1985-1986 and in 1988 to store contaminated soils from the excavations of the former drum storage area at EU 12. Minor staining of the asphalt pavement was noted (CDM, 1991).
EU 15	None	AOC #15	Former Heliport/Storage Area	This unit was used to store miscellaneous equipment. Staining not apparently related to the equipment stored there was noted by EPA personnel (CDM, 1991).
EU 16	AOC 19	AOC #16	Fire Fighting Training Pit	This unit consists of a 20'x20'x4" concrete pit used to contain flammable materials for fire training. The containment integrity of the unit was intact when inspected in 1991 (CDM).
EU 17	SWMU 6	AOC #17	Sanitary Sewage Filter Beds	This unit consists of six 80' x 125' filter beds used to heat raw liquid sewage. This unit was reported to never have been used to treat industrial wastewaters according to CDM (1991).

Table D-2
IDENTIFICATION OF ENVIRONMENTAL UNITS
North Haven Facility
North Haven, Connecticut

EU ID	SWMU/ AOC ID	EPA's PA AOCs ID	Name	Description
EU 18	AOC 15	AOC #18	Wastewater Treatment Plant	This unit is used to treat dilute industrial wastewaters. The wastewaters are subjected to alkaline treatment to precipitate heavy metals and suspended solids. The collected sludge is removed by vacuum filtration and disposed of in a dumpster. The treated wastewater is discharged to an unnamed brook under NPDES permit CT0001284. Prior to 1978, the sludge was disposed in surface impoundments. Since 1978, a vacuum filtration system has been used and the surface impoundments were only used briefly in 1985 due to an emergency. Several releases have been documented, including cyanide-containing plating solutions and untreated wastes (CDM, 1991).
EU 19	SWMU 9A	AOC #19	NPDES Discharge Point, No-Name Brook	This unit consists of the NPDES discharge from the WWTP and overflow from the X-drain. CDM personnel noticed a "whitish grey precipitant" in the bottom of the brook (CDM, 1991).
EU 20	None	AOC #20	1,500-Gallon and 5,000-Gallon Sulfuric Acid tanks	This unit consists of an aboveground 5,000-gallon sulfuric acid tank. The tank is located above a bed of crushed limestone to help neutralize any spills. No releases are known for this unit (CDM, 1991).
EU 21	SWMU 9A, B, C	AOC #21	X (SWMU 9A), Y (SWMU 9B), and Z (SWMU 9C) Drains	These drains collect stormwater runoff from the paved areas of the site. The drains originally terminated separately into the X-brook, but have been re-routed to discharge into the WWTP.

Table D-2
IDENTIFICATION OF ENVIRONMENTAL UNITS
North Haven Facility
North Haven, Connecticut

EU ID	SWMU/ AOC ID	EPA's PA AOCs ID	Name	Description
EU 22	SWMU 3	AOC #22	Former Sludge Lagoons and Former Waste Sludge Pile	This unit consists of two former sludge dewatering lagoons used between 1972 and 1978 and again briefly in 1985. In 1978, the filter cake was stored in a waste pile next to the impoundments. The impoundments were certified clean closed in 1985, but because of the re-use in 1985, they become "regulated units" subject to the 1984 RCRA Hazardous Waste Amendments. A closure plan was submitted to the EPA but has not been approved by EPA Region I. Groundwater sampling has not indicated releases to the groundwater from this source.
EU 23	SWMU 3	AOC #23	Sludge Piping from Wastewater Treatment Plant to Lagoons	This unit consists of the abandoned pressure line which carried sludge from the WWTP to the surface impoundments. There was no evidence of releases from this unit (CDM, 1991).
EU 24	None	AOC #24	Rust-Colored Seep	This unit consists of a rust-colored seep that CDM and EPA personnel which during the August 1989 VSI (CDM, 1991). There was no evidence of release, however, the color of the seep was considered uncharacteristic for the area.
EU 25	SWMU 9B	AOC #25	Possible Unnamed Brook II	This unit is a possible unnamed brook located downgradient of the Y- and Z- drains. The brook was reported to have evidence of intermittent flows, but there was no evidence of releases (CDM, 1991).
EU 26	None	AOC #26	Waste Pile 50 Yards North of PW6 Well	This unit consists of a small pile of waste found on the banks of the Quinnipiac River. At the time of the RCRA Facility Assessment. Pratt & Whitney personnel were unable to characterize the waste. (CDM, 1991).
EU 27	None	AOC #27	Rusted 55-Gallon Drum Location	This unit consists of a rusted drum found approximately 80 feet north of production well PW6.

Table D-2
IDENTIFICATION OF ENVIRONMENTAL UNITS
North Haven Facility
North Haven, Connecticut

EU ID	SWMU/ AOC ID	EPA's PA AOCs ID	Name	Description
EU 28	SWMU 5	AOC #28	Inactive Metal Hydroxide Sludge Disposal Area	This unit consists of two "cells" formerly used to store metal hydroxide sludge. The units were constructed in 1974, used once, then capped with the soil excavated to form the cells. There are no documented releases, however at the areas were reported to have no vegetation (CDM, 1991).
EU 29	None	AOC #29	1,500-Gallon and 2,000-Gallon Waste Soluble Oil Tanks	This unit consists of aboveground waste soluble oil tanks, one 1,500-gallon and one 2,500-gallon capacity. There are no documented releases from this unit (CDM, 1991).
EU 30	AOC 10	AOC #30	Cadmium, Nickel, and Chromium Plating Lines	This unit consists of eight plating lines which carry cadmium, nickel, and chromium plating wastes. Down-gradient monitoring wells have been contaminated with hexavalent and total chromium.
EU 31	AOC 17	AOC #31	Train House	This unit consists of the bulk oil and solvent receiving units. This unit formerly received bulk shipments via railroad; however, as of 1989, the unit was being used for storage and the railroad tracks were being removed (CDM, 1991). There are no known releases from this unit; however there were documented releases in the vicinity (CDM), 1991).
EU 32	None	AOC #32	Old Oil House	This unit consists of the former solvent recovery stills, waste cutting oil reclaimers and new solvent distribution materials. This unit was dismantled in 1988 and there were no documented releases from this unit (CDM, 1991).
EU 33	None	AOC #33	New Oil House and Chlorinated Solvent Recovery Facility	This unit consists of solvent and waste oil recovery systems. This unit replaced the old oil house (EU 32). There are no documented releases from this unit (CDM, 1991).
EU 34	None	AOC #34	Old Oil House Treatment Pits	This unit consists of floor depressions in the old oil house formerly used as containment for the solvent recovery systems. There were no evidence of releases noted by CDM (1991).

Table D-2
IDENTIFICATION OF ENVIRONMENTAL UNITS
North Haven Facility
North Haven, Connecticut

EU ID	SWMU/ AOC ID	EPA's PA AOCs ID	Name	Description
EU 35	AOC 22	AOC #35	Vapor Degreasing Operations	This unit consists of twenty-six vapor degreaser located throughout the facility. At least two degreasers have had known releases, and a soil vapor extraction system was installed at one location (Fuss & O'Neill, 1993).
EU 36	None	AOC #36	Ventilation System and Vents from Process Tanks	This unit consists of the centralized vapor collection system from all production areas. A "heavy oil residue" was noted by CDM personnel (CDM, 1991).
EU 37	None	AOC #37	Transformers and Hydraulic Units	This unit consists of all the electrical substations (17 as of 1989) located on the site. PCB transformer oils were found in the transformers. There are no documented releases from this unit (CDM, 1991).

NOTES:
EU = Environmental Unit
SWMU = Solid Waste Management Unit
AOC = Area of Concern
SWMU/AOC designations taken from report prepared by Fuss & O'Neill (1993).
EPA PA AOC designations taken from report prepared by CDM Federal Programs Corporation (1991).

FIGURES

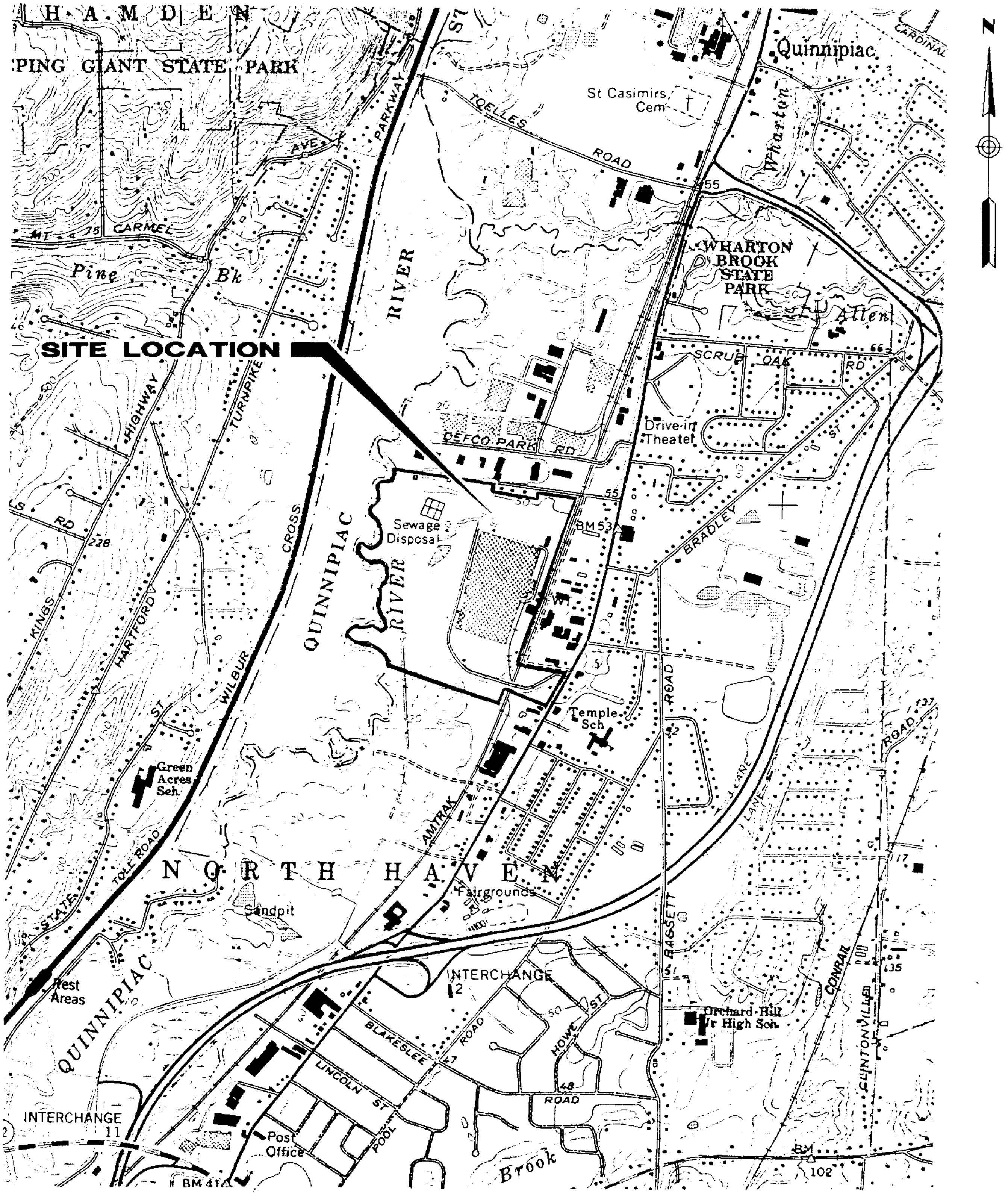


FIG. D-1

MAP REFERENCE:
USGS 7.5 MINUTE SERIES QUADRANGLE
FOR WALLINGFORD, CONN.,
DATED 1967 AND PHOTOREVISED 1984.

1000 0 1000 2000 3000

SCALE IN FEET

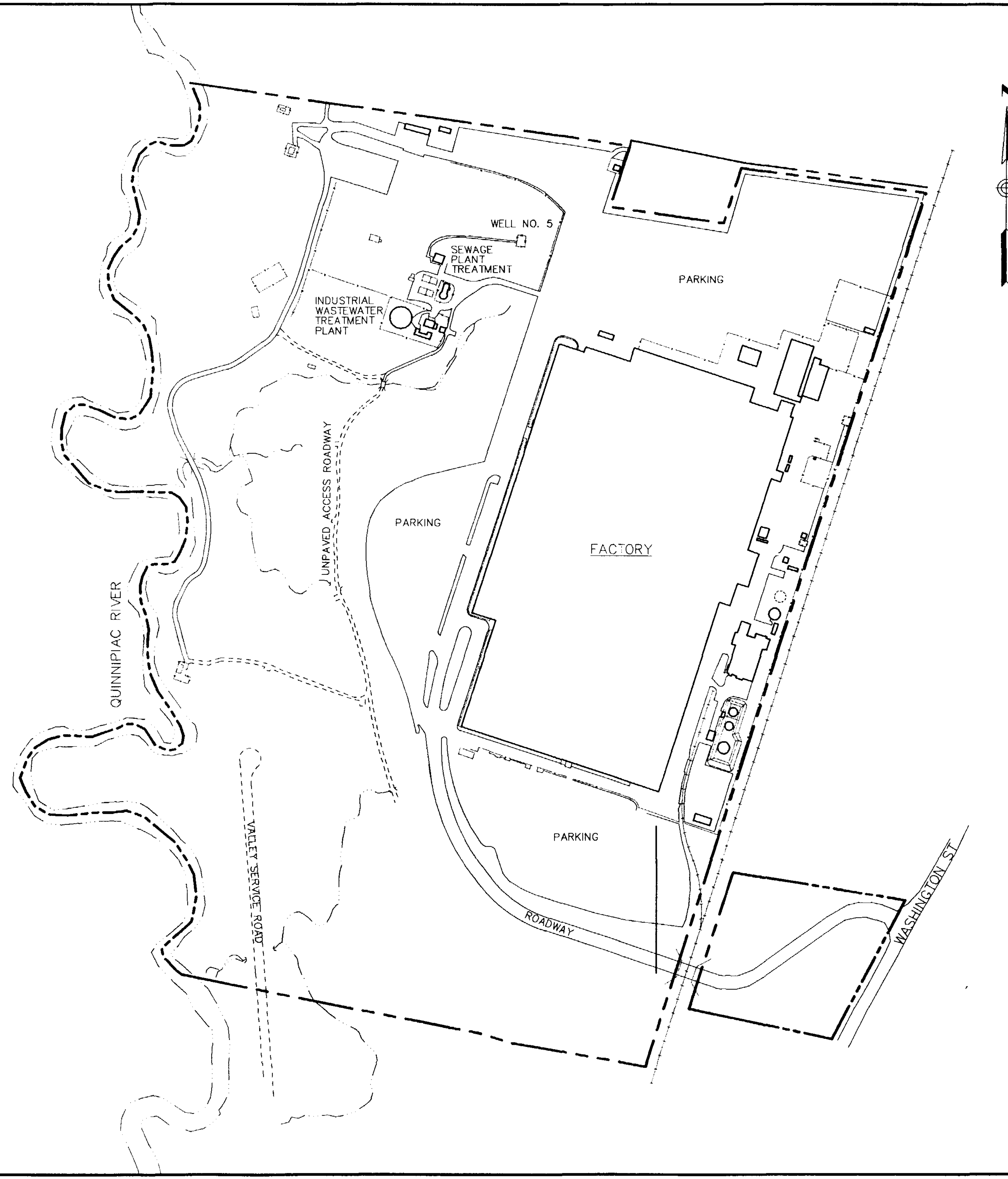
VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY NORTH HAVEN FACILITY

USGS TOPOGRAPHIC MAP

Comm.No.
68VC601

Pratt & Whitney
A United Technologies Company / LEA

VNH-FIGS (1)



LEGEND

Fence line
Railroad line
Edge of pavement
Edge of river
Property line (Approximate location)

MAP REFERENCE:

BUILDINGS, STRUCTURES AND UTILITY LOCATIONS ARE ONLY APPROXIMATE, BASED ON INFORMATION OBTAINED FROM TOPOGRAPHIC MAPS ACQUIRED FROM THE NORTH HAVEN FACILITY.

200 0 200 400 600

SCALE IN FEET

FIG. D-2

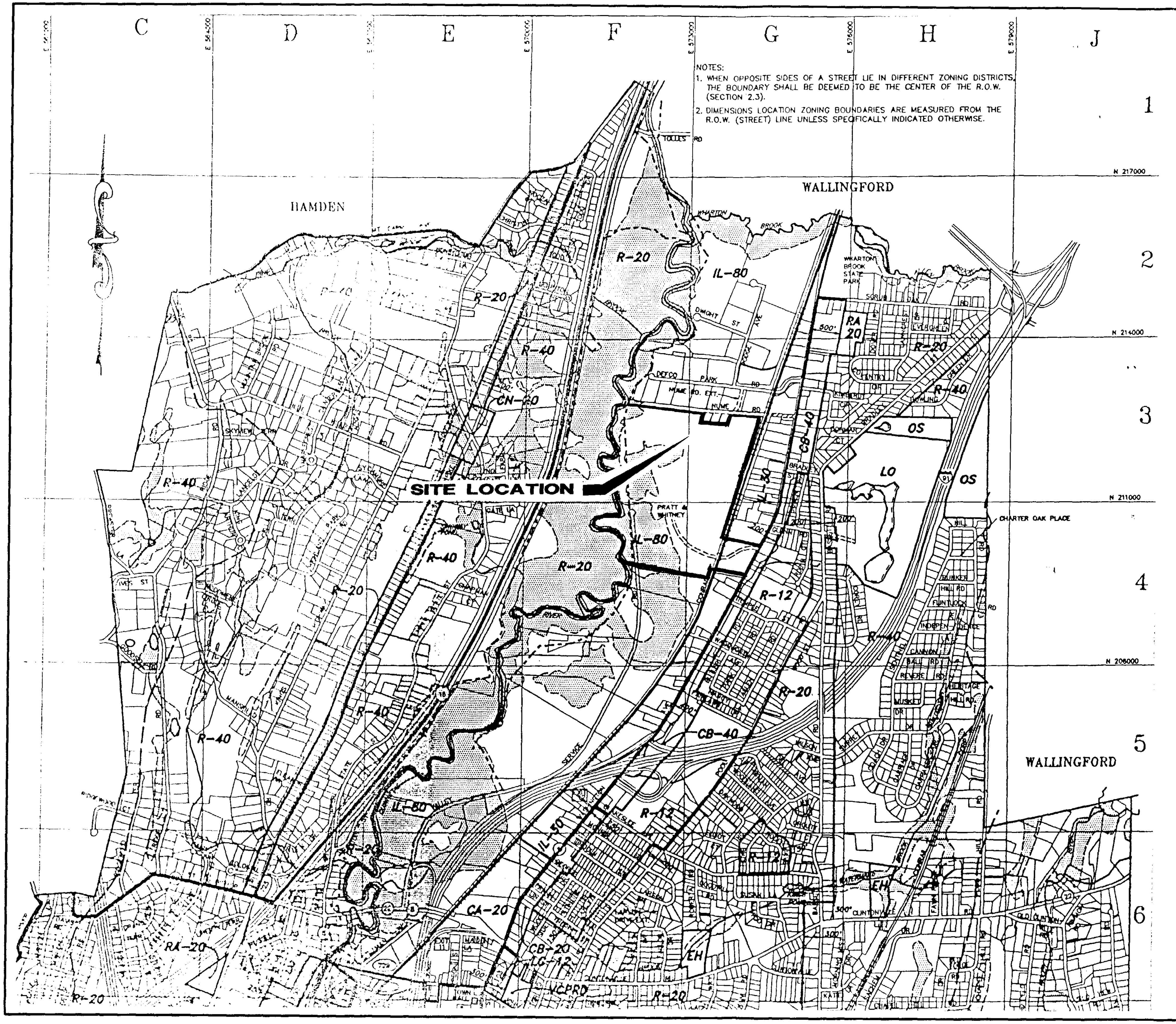
VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY NORTH HAVEN FACILITY

SITE PLAN

Comm.No. 68VC601

Pratt & Whitney A United Technologies Company / LEA

VRH-FIG2 (300)



LEGEND
- TOWN ROAD
- PRIVATE ROAD
- UNIMPROVED ROAD
- PONDS AND LAKES
- RIVER AND STREAMS
- RAILROADS
- DESIGNATED INLAND WETLAND
- COASTAL BOUNDARY
- LIMIT OF AQUIFER ZONE
- CHANNEL ENCROACHMENT LINE

COASTAL BOUNDARY (CAM)

FOR THE TOWN OF:
NORTH HAVEN, CONNECTICUT
ADOPTED: JULY 7, 1980
EFFECTIVE: AUGUST 1, 1980
NORTH HAVEN PLANNING & ZONING COMMISSION

DESIGNATED INLAND WETLAND AND WATERCOURSES

FOR THE TOWN OF:
NORTH HAVEN, CONNECTICUT
ADOPTED: JANUARY 17, 1974
EFFECTIVE: FEBRUARY 1, 1974
NORTH HAVEN INLAND WETLANDS COMMISSION

0 1/4 1/2 3/4 1
SCALE IN MILES
1200 0 1200 2400 3600
SCALE IN FEET

MAP REFERENCE:
"NORTH HAVEN ZONING MAP AND DESIGNATED INLAND WETLAND AND WATER COURSES MAP"
FOR THE TOWN OF NORTH HAVEN, CONNECTICUT
EFFECTIVE DATE OCTOBER 1, 1993.

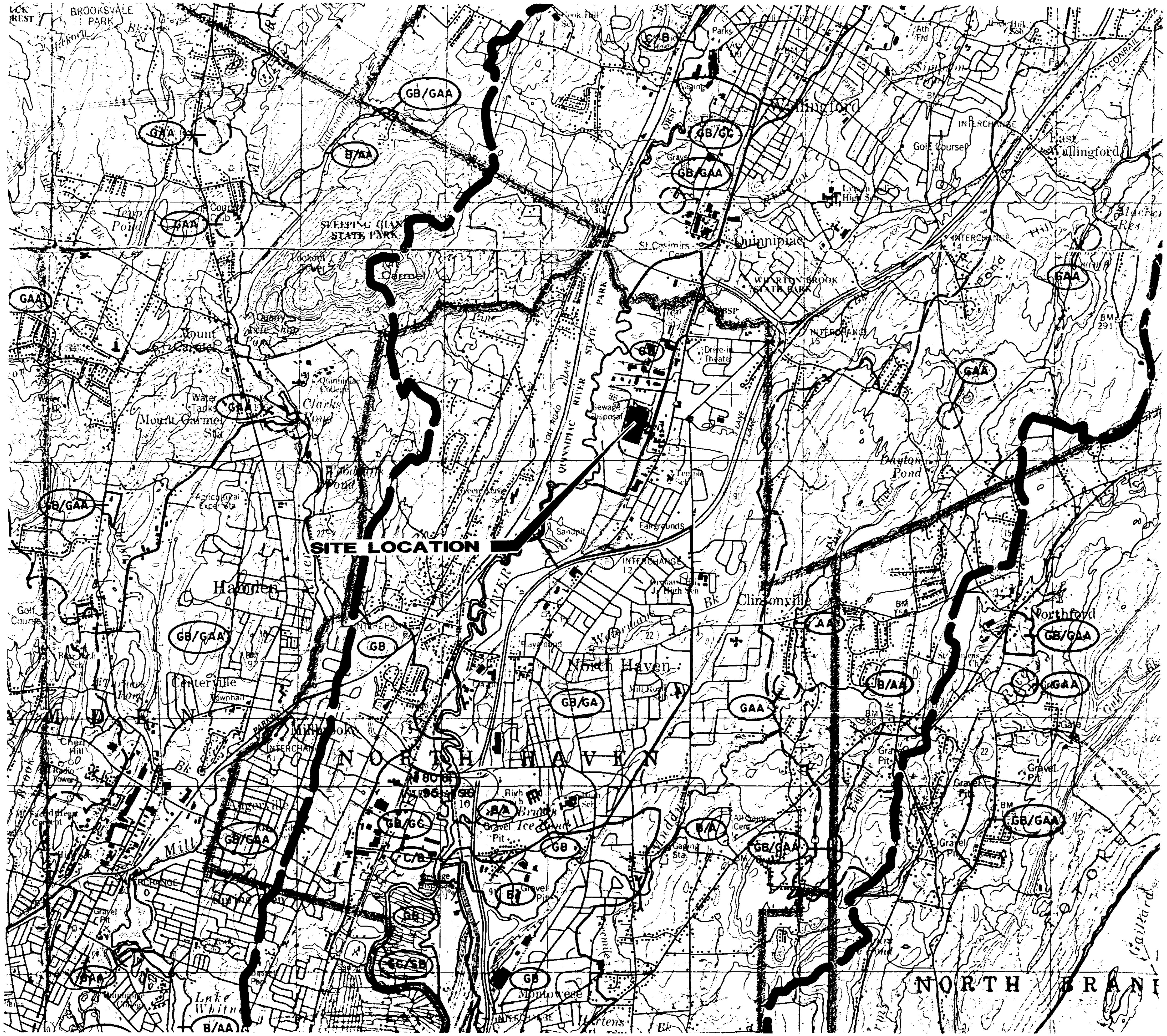
FIG. D-3

VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY NORTH HAVEN FACILITY

ZONING MAP

Comm.No. 68VC601	Pratt & Whitney A United Technologies Company / LEA

VNH-FIGS (1)



LEGEND

Drainage Boundary Line

Town Line

MAP REFERENCE:
THE SURFACE WATER AND GROUNDWATER QUALITY CLASSIFICATIONS USED HAVE BEEN ESTABLISHED BY THE CT DEP, AND ARE DEFINED IN THE CT DEP's NATURAL RESOURCES CENTER PUBLICATION "WATER QUALITY STANDARDS", ADOPTED JANUARY 1992, AND ON THE "WATER QUALITY CLASSIFICATIONS MAP", DATED APRIL 17, 1985.

2000 0 2000 4000 6000

SCALE IN FEET

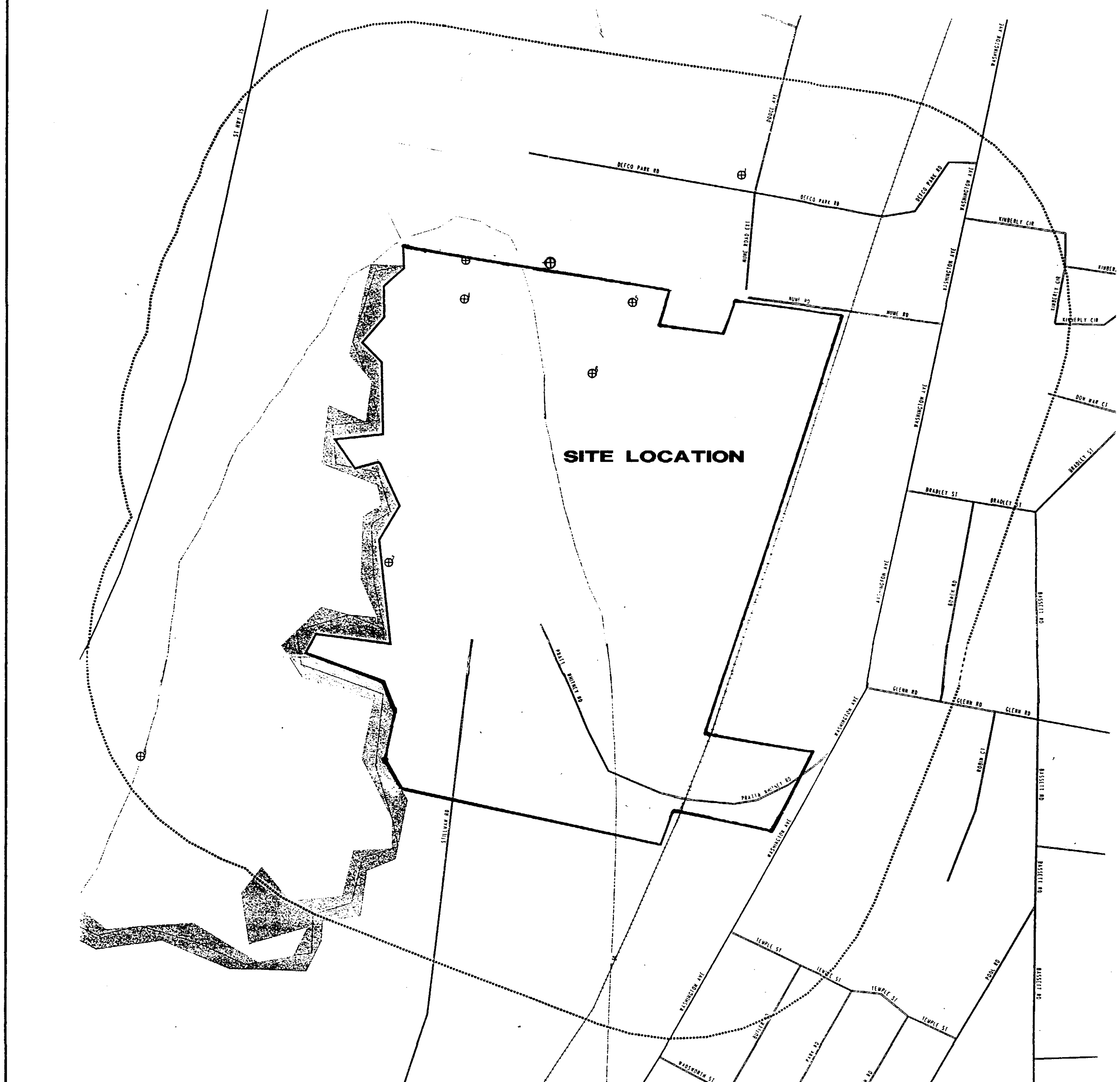
FIG. D-4

VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY NORTH HAVEN FACILITY

WATER QUALITY CLASSIFICATION MAP

Comm.No. 68VC601	Pratt & Whitney A United Technologies Company / LEA

VNH-FIGS (1)



N

LEGEND

⊕5 Well identified by EDR's Well search dated October 1996.

⬡ Public Well as reported in the "Atlas of the Public Water Supply Sources & Drainage Basins of Connecticut", dated June 1982.

——— Property line (approximate location)

.... Search area based on approximate 1/4 mile buffer zone beyond property line.

MAP REFERENCE:
BASED ON DRAWING OBTAINED FROM ENVIRONMENTAL DATA RESOURCES, INC (EDR) AND FROM INFORMATION PRODUCED IN THE PUBLICATION ENTITLED, "ATLAS OF THE PUBLIC WATER SUPPLY SOURCES & DRAINAGE BASINS OF CONNECTICUT, DATED JUNE 1982.

0 1/16 1/8 1/4

Scale in Miles

FIG. D-5

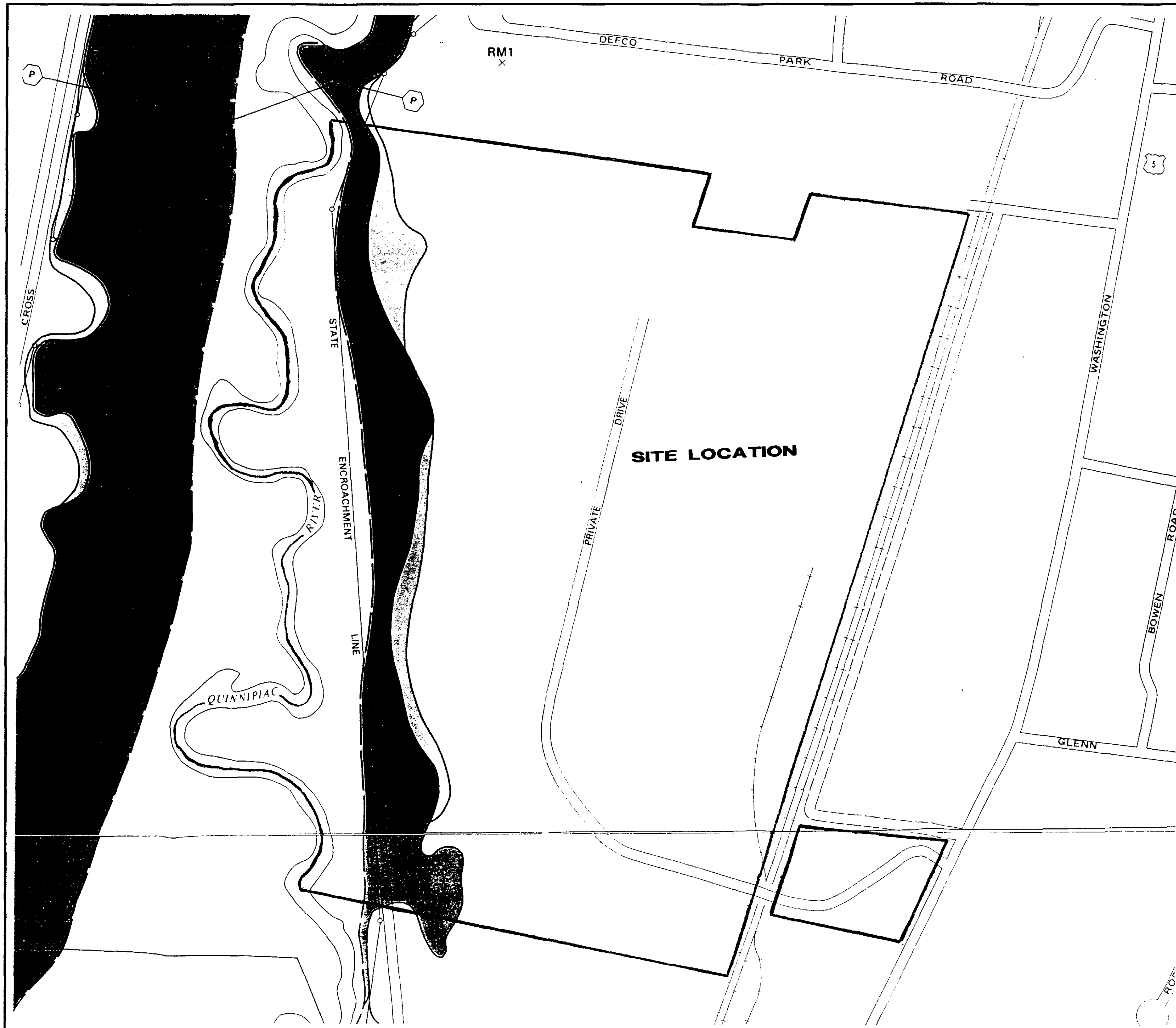
VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY NORTH HAVEN FACILITY

WATER SUPPLIES

Comm.No.
68VC601

Pratt & Whitney
A United Technologies Company / LEA

VNH-FIGS (1)



KEY TO MAP

500-Year Flood Boundary
100-Year Flood Boundary
FLOODWAY FRINGE
100-Year Flood Boundary
500-Year Flood Boundary
100 year
FLOODWAY
500 year
Approximate 100-Year Flood Boundary
Cross Section Line (A)——(A)
Elevation Reference Mark RM7 ×
River Mile • M1.5

N

MAP REFERENCE:
BASED ON INFORMATION OBTAINED FROM THE FLOODWAY FLOOD BOUNDARY AND FLOODWAY MAP FOR THE TOWN OF NORTH HAVEN, CONNECTICUT, NEW HAVEN COUNTY, COMMUNITY-PANEL NUMBERS 090086 0002 & 0004, PANELS 2 & 4 OF 8, MAP REVISED MAY 1, 1985.

200 0 200 400 600
SCALE IN FEET

VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY NORTH HAVEN FACILITY

FLOODPLAIN MAP

Comm.No. 68VC601	FIG. D-6	LEA

VNH-FGS (1)

APPENDIX E
ROCKY HILL FACILITY DESCRIPTION

NOVEMBER 22, 1996

Prepared By:

PRATT & WHITNEY
400 Main Street
East Hartford, Connecticut

In Association With:

LOUREIRO ENGINEERING ASSOCIATES
100 Northwest Drive
Plainville, Connecticut

LEA Comm. No. 68VC601

Table of Contents

FIGURES

TABLES

E. SITE LOCATION AND DESCRIPTION

The Pratt & Whitney Rocky Hill facility is located at 60 Belamose Avenue, Rocky Hill, Connecticut. The facility is located between Belamose Avenue to the west and the Connecticut River to the east, as shown in Figure E-1. The facility consists of a main factory building, a separate power house, and several auxiliary buildings on 51.5 acres of land. A site plan for the facility is presented as Figure E-2.

The site includes two hazardous waste storage buildings located on the east side of the main building, a NPDES-permitted wastewater treatment system located on the south side of the main building, and general flammable materials storage areas (Figure E-2). The facilities are located on the northern portion of the site. The southern portion of the site is the location of a former landfill, and is not presently used.

E.1 Site Use and Ownership

No direct title examinations were performed in preparing this work plan however, information from previous investigations indicates that the site was undeveloped prior to 1927. The site was reported to have been developed in 1927 as the Belamose Rayon plant, and operated as a rayon manufacturing facility until 1965. Past operations were conducted under the following companies:

1927 until 1930s	Belamose Rayon
1930s until 1950s	Hartford Rayon
1950s until 1961	Bigelow-Sanford Carpet Company
1961 until 1965	American Enka Company
1965 until Present	Pratt & Whitney

According to information obtained from fire insurance maps of the site for 1950 and 1953, the facility was owned by the Bigelow Sanford Carpet Company and operated by their Hartford Rayon Company Division. The company produced rayon by the viscose process. The viscose process involves the conversion of cellulose (wood pulp) into rayon by sequentially treating the cellulose with sodium hydroxide, carbon disulfide, and finally a solution of sulfuric acid, sodium sulfate, and zinc sulfate. The process results in the production of rayon, and various waste products including waste viscose, an intermediate xanthate compound resulting from the reaction of carbon disulfide with a sodium salt of cellulose, and acid tow (waste acid/salt solution).

To support the rayon production, ancillary operations at the facility included chemical storage, steam production from fuel oil-fired boilers, water treatment, and electricity generation and distribution. Chemical storage included the capacity to store production level quantities of sulfuric acid (131,400 gallons), carbon disulfide (40,000 gallons), and sodium hydroxide (180,000 gallons). The boilers have been used to produce steam for heat and possibly for electricity generation, based on the presence of a dynamo near the boiler house. Fuel for the boilers was stored in five 20,000 gallon underground storage tanks near the boiler house. An additional 1,000 gallon fuel oil tank was located adjacent to the storehouse building and was used to supply fuel oil to the storehouse boiler. Water treatment facilities were located north of the main factory building. The water treatment system consisted of anthracite filters and traditional cation-exchange water softening. Coal and brine for the water treatment system were stored in the water treatment building. At least some of the electricity for the site appears to have been generated on-site, based on the presence of a dynamo north of the boiler room. However, the dynamo may have been used only for emergency power. There are no notations on the available maps to indicate the exact usage of the dynamo. At least four major power transformers are indicated on the 1953 fire insurance map; three 333 kVA transformers and one 50 kVA transformer. At least two wall-mounted transformers associated with exterior lighting are also indicated on the 1953 fire insurance map.

The facility is used for the manufacture of jet engine components and assemblies (SIC Code 3724). The manufacture of jet engine components is a high technology industry often using state-of-the-art materials and processes. Wastes are generated through a variety of these processes including fabricating, metal casting, testing, cleaning, finishing, coating, and research operations. These operations involve a variety of materials including polyamide fibers, graphite, plastics, aluminum, titanium, resins, and stainless steels. The processing of these materials involves the use of a variety of compounds for working, cleaning, and evaluating.

E.2 Review of Published Information

E.2.1 City Directory Search

LEA contracted with Environmental Data Resources, Inc. (EDR) to search for available city directories of the Rocky Hill area and provide an abstract of information found there. EDR reviewed Price & Lee City Directories from 1956 until 1977 at approximately five-year intervals.

A listing was found for the Hartford Rayon Company in the 1956 Price & Lee City Directory, and a listing was found for Pratt & Whitney Aircraft Division of United Technologies in the 1977 Price & Lee's City Directory. No listing for adjoining properties was identified.

E.2.2 Fire Insurance Map Review

The earliest direct site information examined as part of this investigation was one 1950 Sanborn® Fire Insurance Map, when the site was owned and operated by the Hartford Rayon Corporation. The map did not cover the area of the former American Enka Company landfill south of the main facility, and notations on the map indicate that the landfill area was not mapped. General operations, chemical storage areas, and general building construction are noted. To the north of the site was the Crown Petroleum Corporation tank farm. This site, which appears to still be a petroleum tank farm based on 1990 aerial photographs, was listed as having had five fuel oil tanks, one kerosene tank, three gasoline tanks, three solvent tanks, and one "chemical tank.".

E.2.3 Topographic Map Review

The site is located near the eastern edge of the Hartford South, Connecticut Topographic Quadrangle; the Glastonbury quadrangle is immediately to the east of the Hartford South quadrangle. A search for historical topographic maps, by Environmental Data Resources, Inc., located five historic topographic maps each of the Hartford and South Glastonbury quadrangles. The dates for these maps are: Hartford South - 1964, 1972, 1976, 1984, and 1992; Glastonbury - 1953, 1964, 1972, 1984, and 1992.

The 1964 topographic map shows the site as owned by the American Enka Company. The map shows a main factory building and the ancillary structures (boiler house, storage areas, and water treatment facility). The majority of the eastern part of the site is indicated on the map symbols as wooded or swamp land. There is no indication of the former landfill area. The Crown Petroleum tank farm is indicated to the north, and the majority of the surrounding area is lightly populated residential.

The 1972 topographic map shows the main factory building, and it appears similar to the present day. There are not as many storage buildings or covered areas indicated. There's an apparent increase in the size of the sand and gravel pits to the west of the site, across Belamose Avenue.

The 1976 topographic map shows minor changes to ancillary buildings on the site, but very little additional development immediately surrounding the site.

Minor additions to the ancillary structures on the site appear on the 1984 topographic map. The surrounding areas show commercial development to the west of the site, and additional residential development farther to the west side, along and adjacent to Main Street. The area to the south of the site, along and the west of the Connecticut River, has remained essentially undeveloped except for some sand and gravel pit operations.

The 1992 topographic map shows considerable commercial/industrial development in the area surrounding the site, and considerable residential development farther to the west, along and adjacent to Main Street.

E.2.4 Aerial Photograph Review

Aerial photographs of the site for the years 1965, 1970, 1975, 1980, 1986 and 1990 were reviewed at the Connecticut Department of Environmental Protection. Additional photographs available at the State library were not reviewed in preparing this work plan since a detailed review of aerial photograph reviews was intended as a part of this portion of the project.

In the 1965 aerial photograph, the American Enka Company landfill area is clearly visible in the southern portion of the site. The general layout of the site as well as several ancillary structures are much as they are today. The water tank, water tower, the weld shop building, and carpenter shop are visible. A sand and gravel pit is evident to the southwest of the site, and the tank farm to the north of the facility is present. The majority of the area is undeveloped.

The layout of the facility, the outbuildings and storage areas in 1970 and 1975 aerial photographs are generally similar to those of the present. The surrounding areas remain largely undeveloped. The former American Enka Company landfill area appears to have been regraded and not in use.

The 1980 aerial photograph shows minor changes at the site. The dock is gone and some additional small outbuildings have been constructed in the rear of the facility. Between 1975 and 1980 the surrounding areas have become industrialized.

Since 1980, there appears to have been additions to the wastewater treatment system, but no other significant changes to the facility or site. No significant changes to the surrounding areas are observed in the 1986 aerial photograph.

In the 1990 aerial photograph, the area surrounding the facility has become more heavily industrialized while the area to the southwest has remained a sand and gravel pit. South along the river remains undeveloped for a considerable distance, and to the north, the tank farm remains. Small changes to external storage areas are visible since the 1986 aerial photograph was taken, but no major structural changes are evident.

E.3 Land Use

The site consists of approximately 51.5 acres of land situated along the western shore of the Connecticut River, just to the north of Dividend Brook. Dividend Brook discharges into the Connecticut River at the southeast corner of the property. The site and surrounding area are zoned "Manufacturing" or "Office Industry" as shown on Figure E-3.

The site was the location of rayon manufacturing companies from 1927 until 1965. No formal title review was conducted as a part of preparation of this work plan, therefore there is no information regarding uses of the site prior to 1927. Operations at the site were likely to have been rayon manufacturing by the so-called viscose process discussed previously. In 1965, the property was sold by the American Enka Company to Pratt & Whitney, and as part of the move from the site, American Enka was reported to have demolished the buildings, and landfilled the debris along with waste viscose and acid tow in the landfill south of the facility.

Since 1965, the site has been owned and operated by Pratt & Whitney has used the site exclusively as a manufacturing facility. Ancillary activities at the site include raw materials storage, flammable materials storage, and wastewater treatment for the anodizing line wastewater. Electrochemical machining (ECM) was used at the facility until 1990. A treatment system, formerly used to treat ECM solutions, was also dismantled in 1990.

E.4 Groundwater and Surface Water Classification

The DEP has adopted water quality classifications for the groundwaters and surface waters of the State to categorize the existing quality of the water, the potential uses of the water, allowable discharges to the water, and the long-term State goals for water quality restoration. Surface waters and groundwaters are classified separately, and both classification schemes are based on the water quality standards adopted by the DEP.

In the vicinity of the site, the surface water quality classification of the Connecticut River is SC/SB. A classification of SC indicates that the existing surface water quality is known to be polluted. In such waters, certain designated uses, such as swimming or providing for a healthy aquatic habitat may be precluded or limited. The State's goal is to improve water quality to SB conditions. Class SB waters are high quality coastal and marine surface waters with designated uses for marine fish, shellfish, and wildlife habitats, recreation, industrial, and other legitimate uses, including navigation.

Dividend Brook has a surface water quality classification of B. Class B waters are high quality surface waters with designated uses for fish and wildlife habitats, recreation, agricultural, industrial, and other legitimate uses, including navigation.

Groundwater quality in the area of the site has been classified as GB. Class GB groundwaters are waters within historic highly urbanized areas or areas of intense industrial activity and where public water supply service is available. Class GB groundwaters are presumed suitable for industrial uses, but are presumed to be unsuitable for direct human consumption due to waste discharges, spills or leaks of chemicals, or other land use impacts. Water quality classifications are shown on Figure E-4.

E.5 Water Supplies

The Rocky Hill area is supplied with drinking water from the Metropolitan District Commission. The water is supplied from reservoirs eight or more miles from the Rocky Hill site. There are eight public drinking water supply wells within four miles of the Rocky Hill facility. The closest of these wells is approximately 0.6 miles from the facility (as shown on Figure E-5).

Three production wells were located on the Sanborn Fire Insurance map for the Hartford Rayon Company. Two of these wells, No. 1 and No. 2 were listed as "not in use," the status of these wells is not currently known. The third well is the existing Ranney-type collector well located adjacent to the Connecticut River, near the northeast property corner. The water from this well is presently used solely as process water.

E.6 Floodplain Information

The Rocky Hill site, including the hazardous waste management units, is located within the 100-year floodplain of the Connecticut River. A copy of the flood profiles are presented on Figure E-6.

E.7 Surface Water Drainage

The site has approximately 20 feet of topographic relief. The land rises steadily westward from an elevation of approximately 25 feet MSL at the Connecticut River to a high elevation of approximately 45 feet MSL at the northwest corner of the property. Approximately half of the site is covered by buildings, paved parking areas, and covered structures. The areas surrounding the Connecticut River and Dividend Brook have been allowed to "grow in," including the area of the former American Enka landfill. Surface water from the site would be expected to runoff to the southwest, toward Dividend Brook. Runoff from impervious areas is collected in catch basins and carried to Dividend Brook in underground piping.

E.8 Regional Geology

Surficial geology in the vicinity of the facility consists of alluvium and terrace alluvium deposited by the Connecticut River. Terrace alluvium is typically a thin layer of sand and gravel deposited over stream terraces. To the west of the site, the surficial materials are composed of glaciofluvial deposits consisting typically of reddish-brown sand, gravel, and silt deposited by glacial meltwater streams. The glaciofluvial deposits are expected to underlay the terrace alluvium at the site.

The central Connecticut River Valley, including the Rocky Hill area, is underlain by late Triassic-age sedimentary rocks, chiefly red and gray sandstones, siltstones, and shales, interbedded with basaltic lava flows, that were deposited in the Hartford Basin. The bedrock generally dips toward the east-southeast toward Border Fault which is located less than two miles from the site (Hubert, et al, 1978).

E.9 Site Geology

The surficial geology of the site has been mapped as terrace alluvium (Deane, 1967), which consists of river-deposited sediments laid on the tops of river-cut terraces during times of flood. The terrace alluvium is typically 4 to 5 feet thick and consists primarily of sand-size material with some silt and gravel. In the vicinity of the site, it is likely that this alluvium is underlain by glaciofluvial sediments deposited by glacial meltwaters. These sediments may vary widely in grain size due to variations in the carrying capacity of the streams which deposited the material. Deposits in the vicinity of the site are reported to consist primarily of sand and gravel, with sand-size material predominating. No information on materials actually present beneath the site is currently available.

The bedrock in the immediate vicinity of the site has been mapped as the East Berlin Formation (Rodgers, 1985), which is composed of interbedded sandstones, shales, and mudstones. The depth to bedrock has been reported as approximately 50 to 100 feet below the surface.

E.10 Regional Hydrology and Hydrogeology

Regional hydrogeology is controlled by the Connecticut River, and to a lesser extent by Dividend Brook. Regional groundwater flow is expected to be generally in a south-southeasterly direction, following the trend of the river valley. Local groundwater flow directions, however, will be influenced by topographic expression, local stratigraphic heterogeneities, and anthropogenic features, such as water supply wells.

E.11 Site Hydrogeology

The hydrogeology of this site has not been defined, as there are no monitoring wells. The site hydrogeology is expected to be strongly influenced by the location of the Connecticut River along the eastern boundary of the site, and by Dividend Brook along the southern boundary of the site. Although groundwater flow on the site has not been defined due to the lack of on-site hydrogeologic investigations, groundwater is presumed to flow to the south-southeast toward the Connecticut River - Dividend Brook confluence.

E.12 Facility Operations

The facility is used for the manufacture of jet engine components and assemblies (SIC Code 3724). Manufacturing of jet engine parts involves a variety of metal and composite processing operations. Typical manufacturing operations include autoclave curing, platen press forming, laser drilling, metal forming, machining, heat treating, welding, coating, non-destructive testing, bonding, chemical cleaning, surface conditioning (abrasive media blasting or tumbling), chemical conditioning/coating (pickling, anodizing, plating, chemical milling descaling, etching, stripping).

In addition to the manufacturing process, various ancillary activities take place at the site to support the equipment production. These ancillary activities include hazardous waste storage, steam generation for heat, the dilute wastewater treatment operation, equipment maintenance, battery charging stations, and building maintenance operations. These operations take place in a variety of locations throughout the site.

The hazardous wastes generated at this facility are (or were) water solutions (both concentrated and dilute, containing acids, alkalies, and heavy metals), wax/solvent and oil/solvent mixtures, spent solvents, waste paints, F006 sludge from the on-site dilute wastewater treatment system, and laboratory chemicals.

E.13 Waste Generation, Handling, and Characteristics

A variety of wastes are (or were) generated as a result of manufacturing, testing, maintenance and remediation activities conducted on-site. These wastes include: oils and scrap metal from machining and forming; acids, alkalies, and solvents from chemical cleaning; waste sand and grit from foundry operations and abrasive cleaning; various liquid and solid wastes from non-destructive testing; waste paint and related materials from protective coating activities; waste sealants and adhesives from bonding operations; and solvent contaminated debris, non-contact cooling, water, and dilute wastewater from various manufacturing operations.

Non-contact cooling waters and treated dilute industrial wastewaters are discharged to Dividend Brook, which in turn flows to the Connecticut River, under an NPDES Permit. Hazardous wastes are accumulated and stored on-site for less than 90 days while awaiting shipment for off-site disposal. Waste water soluble oil is stored on-site in a 5,000 gallon underground storage tank prior to off-site disposal. The variety of other wastes generated are also stored on-site while awaiting shipment for off-site disposal.

E.14 Waste Disposal Practices

Facility-generated wastes are disposed of either through the East Hartford facility, or through commercial waste disposal facilities. Many of these wastes are disposed of by vendors who utilize various methods including, but not limited to, incineration, fuels blending, fuels blending for energy recovery, wastewater treatment, distillation or solvent extraction, chemical fixation or deactivation, and land disposal. Wastes shipped to the East Hartford facility are typically acids, alkalies, and oxidizers. Other wastes including scrap metal and chlorinated solvents are picked up by vendors and recycled.

E.15 Regulatory Status

The facility is regulated under RCRA, the Clean Air Act (CAA), and NPDES. The facility is a large quantity generator of hazardous wastes. The facility's EPA identification number is CTD001449511. A RCRA Part A permit was submitted by the facility on October 21, 1986. A RCRA Part B permit application was submitted by the facility on November 8, 1988. The facility's dilute wastewater treatment facility is permitted under NPDES. The facility has air emission permits to operate the boiler, and the spray coating lines.

LEA contracted with Environmental Data Resources, Inc. (EDR) to conduct a search of the available State and federal databases for references to the Rocky Hill facility. EDR research indicated that the Rocky Hill site is listed on the following databases: Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) ; Facility Index System (FINDS); Toxic Release Inventory System (TRIS); State of Connecticut Underground Storage Tanks (UST); and Resource Conservation and Recovery Information System (RCRIS). On the CERCLIS database, the site is reported as currently under investigation by the government to assess the extent of further action; CERCLIS discovery was reported as completed on January 17, 1990 and the Preliminary Assessment was reported completed on September 30, 1992.

In the RCRIS database, the site is listed as both a large quantity generator and a transport, storage or disposal facility. The site was also listed as having three compliance evaluations, completed on August 30, 1994, July 20, 1992, and January 18, 1991. The facility is listed as having an active water discharge permit, and as being monitored or permitted for air emissions under the Clean Air Act. In addition, an extensive listing of reported spills at the facility, and surrounding locations was included.

There were three active and six removed underground storage tanks (USTs) listed for the site. This corresponds to data collected at the CT DEP by LEA personnel.

E.16 Known Releases

Based on files maintained at the CT DEP, between 1982 and 1995, 19 spills of greater than 100 gallons were recorded at the facility. The larger spills were released into containment vessels and had, therefore, little chance to impact the site conditions. Many smaller spills were reported, although the exact circumstances of the spill, and the status of the spill were not always recorded.

E.17 Facility Investigations

No significant subsurface investigations have been conducted at the facility. To date, the only formal environmental investigations which have been conducted at the facility are the Visual Site Investigation (VSI) and the Preliminary Assessment (PA) performed by Halliburton NUS Corporation on behalf of the US EPA. Soil and surface water samples were collected as part of the VSI; however, the PA report indicated that the results of the sampling were "inconclusive." A data quality review performed for the US EPA as part of the VSI indicated that the organic analytical data were unusable because of poor laboratory quality control, field and equipment blank contamination, and excessive holding times. Metals concentrations detected in the soil samples were considered "somewhat higher than normal" (lead at 338 ppm, and zinc at 147 ppm), compared to other NUS investigations. The report concluded however, that there did not appear to be any evidence of gross contamination at the site.

No other formal environmental investigations have been performed on the site to date. Some sampling was performed in 1979 by the DEP in response to a citizen's complaint regarding "leaching" of material into Dividend Brook. The sample, was analyzed for metals and organic contaminants by the Connecticut Department of Health Services laboratory (now the Connecticut Department of Public Health). Acetone, amyl acetate, heptane, pentane, toluene, and two unidentified compounds were detected, along with chromium, nickel, and nitrite and nitrate nitrogen. In addition, the sample was reported to have a "strong septic" smell. Memoranda from DEP personnel found in the facility files indicate that the "leaching" had also been observed in 1973.

E.18 Identification of Environmental Units

For the purposes of this report, the term Environmental Unit (EU) is used to describe any area, equipment location, solid waste management unit (SWMU), or other location where any potential environmental impairment may have occurred. The 1992, Halliburton NUS Corporation's Preliminary Assessment report identified 13 including the hazardous waste storage area, the former American Enka landfill area, and several production departments where hazardous wastes are generated. The EUs identified in Table E-1 were based on this Preliminary Assessment. The previously identified AOCs have been re-numbered as Environmental Units for the purposes of the VCAP. These numbers are included in Table E-1.

E.18.1 Remediation Activities

No interim measures have been performed at the facility.

TABLES

Table E-1
IDENTIFICATION OF ENVIRONMENTAL UNITS
Rocky Hill Facility
Rocky Hill, Connecticut

EU ID	AOC ID	Name	Description
EU 1	AOC #1	Composites Department	This unit consists of fifteen 1,600-gallon dip tanks, ten 650-gallon dip tanks, two 5,000-gallon underground collection tanks, and two 2,500-gallon slurry tanks. The unit was placed in operation in 1983 and operation continues. There is no evidence of releases from this unit.
EU 2	AOC #2	Electrochemical Machining	This unit consists of two 7,500-gallon hydrochloric acid tanks and one 10,000-gallon sodium hydroxide tank. This unit was operational from 1972 until October 1990. There were two documented releases from this unit.
EU 3	AOC #3	Waste Water - Soluble Oil Tank	This unit consists of one 5,000-gallon underground collection tank for water-soluble cutting oil. This unit was placed in service in 1967 and operation continues. There is no evidence of release from this unit.
EU 4	AOC #4	Vapor Degreasers	This unit consists of vapor degreasers located in the composite and machining departments. These degreasers use 1,1,1-trichloroethane as the solvent. The units were installed in the mid-1960's and operation continues. There is no evidence of release from these units.
EU 5	AOC #5	Flammable Liquid Storage Building	This unit consists of a 30'x30' prefabricated storage buildings used to store flammable liquids. The buildings were installed in 1990 and operation continues. There is no evidence of releases from this unit.
EU 6	AOC #6	Hazardous Waste Storage Area	This unit consists of five, 20'x8' prefabricated storage building used to store hazardous wastes. The building was installed in 1990 and operation continues. There is no evidence of releases from this unit.
EU 7	AOC #7	Former Hazardous Waste Barrel Storage Area	This unit consists of a sheltered area on the exterior of the east side of the building. This unit was placed into operation in 1983 and operation continues. There is no evidence or releases from this unit.
EU 8	AOC #8	Flammable Materials Storage Shed	This unit consists of two, 10'x5' metal sheds used to store flammable materials. It is not known when these units were placed into service but operation continues. There is no evidence of releases from these units.

Table E-1
IDENTIFICATION OF ENVIRONMENTAL UNITS
Rocky Hill Facility
Rocky Hill, Connecticut

EU ID	AOC ID	Name	Description
EU 9	AOC #9	Chlorine Storage Tank	This unit consists of a one ton underground chlorine gas tank used to treat process water from the production well. It is not known when this unit was placed into operation; however, as of 1992, operation was scheduled to be discontinued when the facility switched to bottled chlorine gas. There is no evidence of releases from this unit.
EU 10	AOC #10	American Enka Landfill Area	This unit consists of the former American Enka landfill area. The landfill was used until 1965 when American Enka landfilled all the building material from razing the old factory and remaining process waste (waste rayon, acid tow, and waste xanthanate). The landfilled was capped and graded. A leachate outbreak into Dividend Brook was reported in 1984, however sampling results were inconclusive.
EU 11	AOC #11	NPDES Outfall	This unit consists of the outfall from the NPDES-permitted discharge of treated wastewater from the composites department. This unit was placed into operation in 1983 and operation continues. There is no evidence of releases from this unit.
EU 12	AOC #12	Petroleum Products Storage Area	This unit consists of two 20,000-gallon USTs of #6 fuel oil and three 275-gallon aboveground storage tanks containing ASTs of diesel fuel. Three 20,000-gallon USTs formerly used to store #6 fuel oil were removed from this unit in 1989. It is not known when this unit was placed into service, however operation continues. There are two known releases of #6 fuel oil from this unit.
EU 13	AOC #13	Aluminum Foundry	This unit consists of the aluminum foundry. The foundry has three pots for aluminum and brass castings. It is not known when this unit was placed into operation, however operation continues. There is one documented release of molten aluminum from this unit.

NOTES:
EU = Environmental Unit
AOC = Area of Concern
AOC designation is taken from a report prepared by Halliburton NUS Corporation (1992).

FIGURES

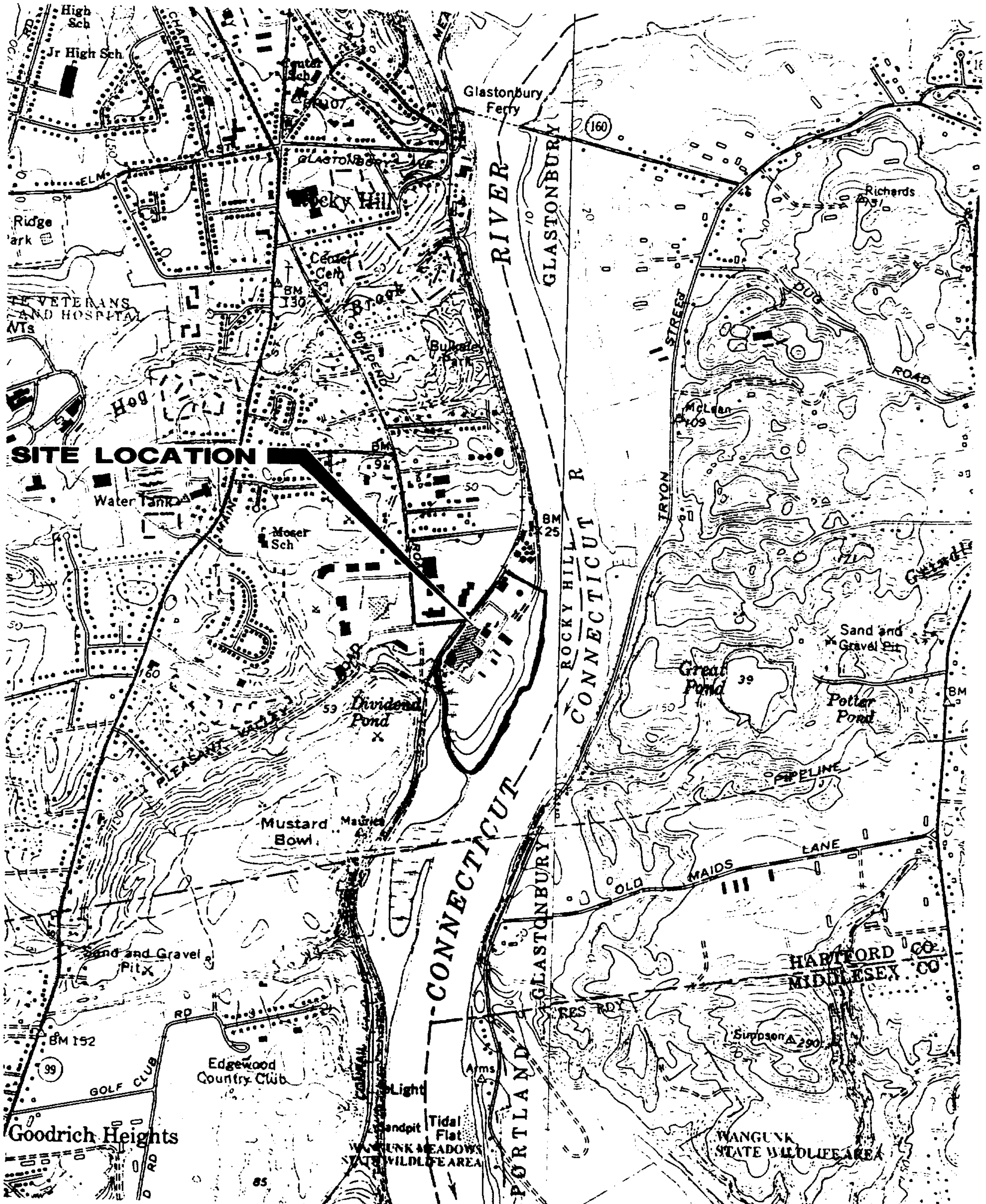


FIG. E-1

MAP REFERENCE:
USGS 7.5 MINUTE SERIES QUADRANGLES FOR HARTFORD SOUTH, AND GLASTONBURY, CONN., DATED 1964 AND REVISED 1992.

1000 0 1000 2000 3000

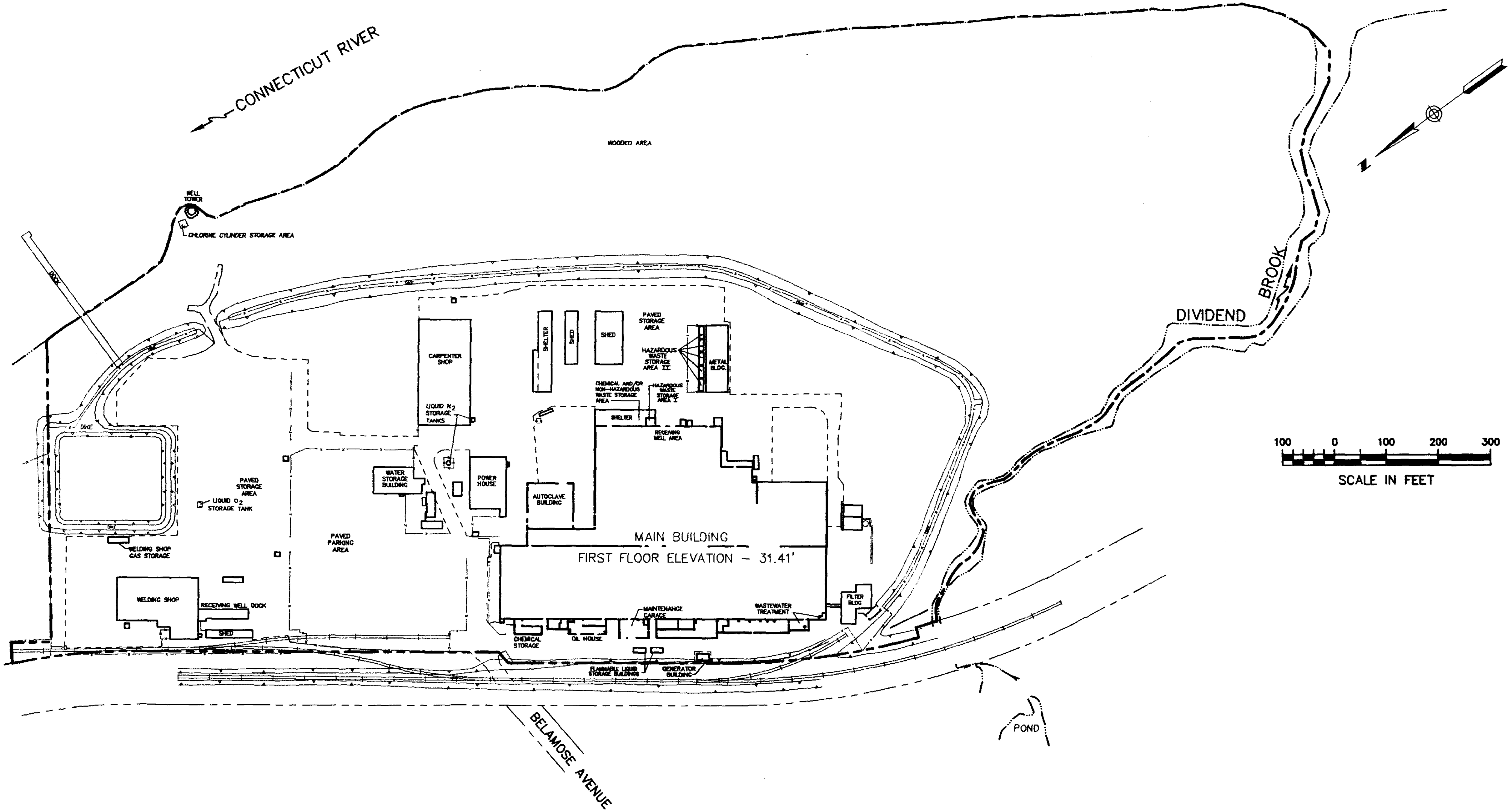
SCALE IN FEET

VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY ROCKY HILL FACILITY

USGS TOPOGRAPHIC MAP

Comm.No. 68VC601	Pratt & Whitney A United Technologies Company / LEA

VRH-FIGS (1)



LEGEND

- Fence line
- Edge of pavement
- Property line (Approximate location)
- Railroad line
- Dike

MAP REFERENCE:
BUILDINGS, STRUCTURES AND UTILITY LOCATIONS ARE ONLY APPROXIMATE, BASED ON INFORMATION OBTAINED FROM TOPOGRAPHIC MAPS ACQUIRED FROM ROCKY HILL TOWN HALL.

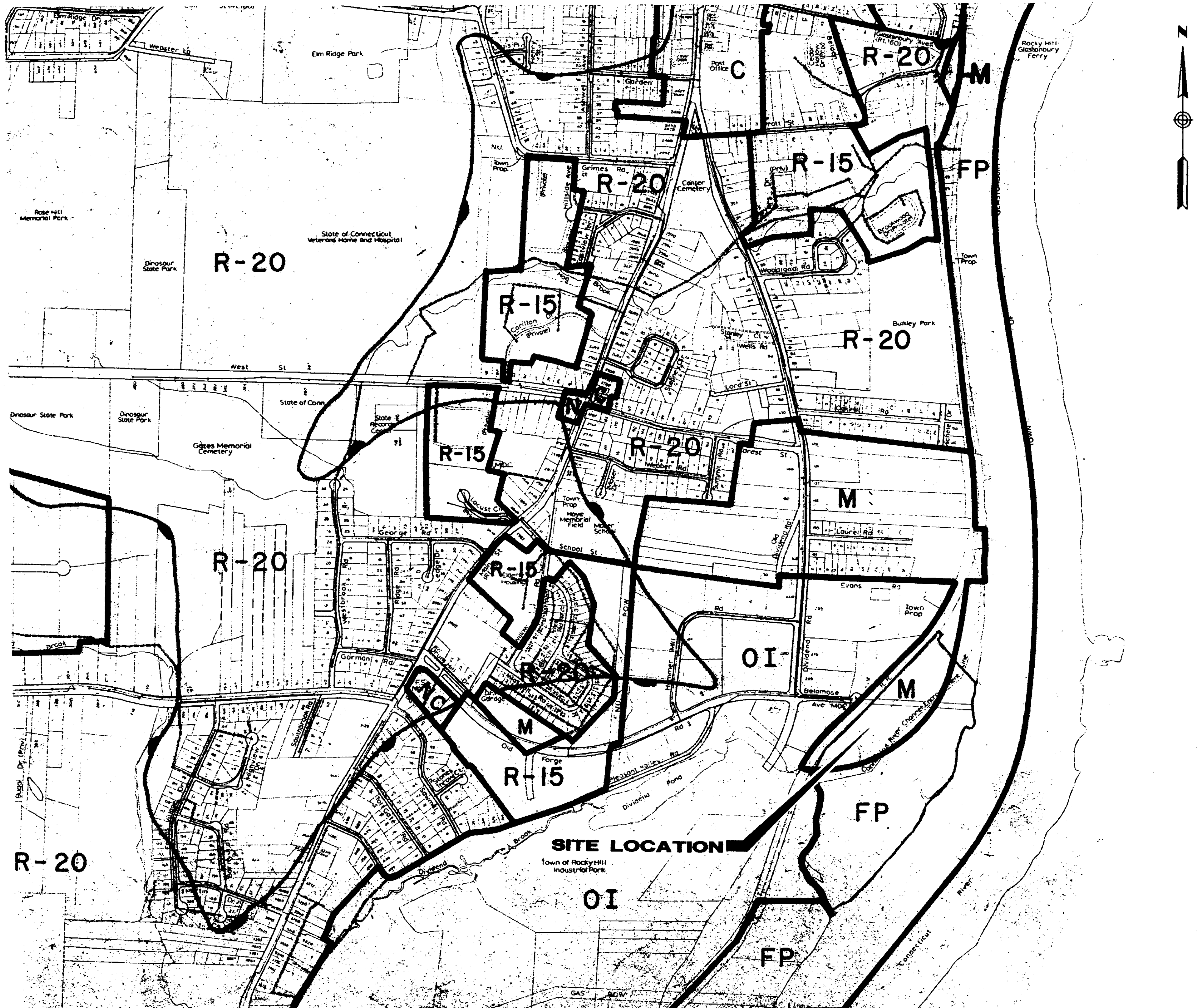
FIG. E–2

VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY ROCKY HILL FACILITY

SITE PLAN

Comm.No. 68VC601	Pratt & Whitney A United Technologies Company / LEA

VRH–FIG2 (200)



LEGEND

C	Commercial
EOD	Executive Office District
FP	Flood Plain
HC	Heavy Commercial
M	Manufacturing
NC	Neighborhood Commercial
OI	Office Industry
R–15, R–20, R–40	Residential
RC	Restricted Commercial

MAP REFERENCE:
ZONING MAP OF THE TOWN OF ROCKY HILL
APPROVED: AUGUST 8, 1988
EFFECTIVE: SEPTEMBER 1, 1988
LAST REVISION: MAY 1, 1995

500 0 500 1000 1500
SCALE IN FEET

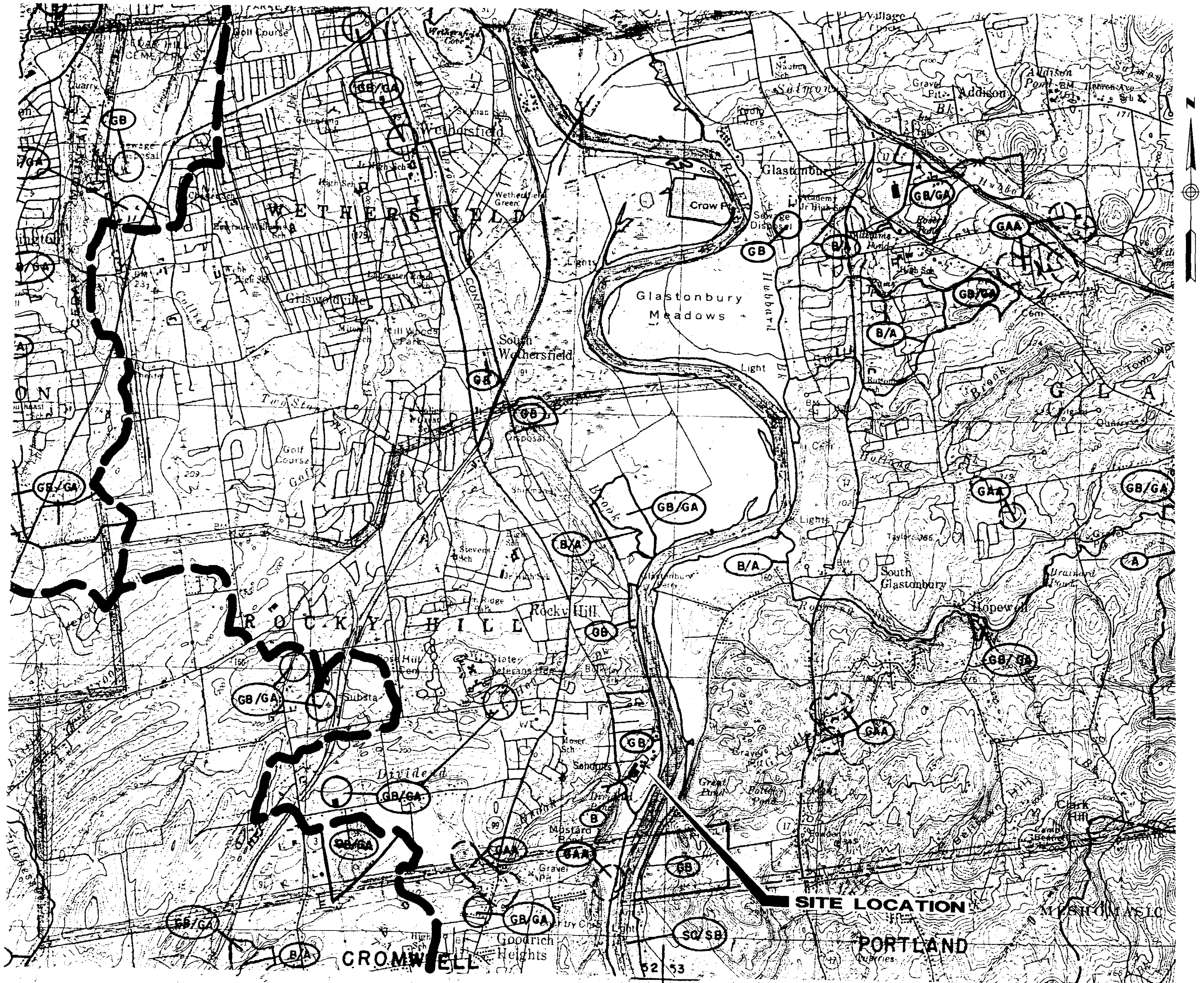
FIG. E–3

VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY ROCKY HILL FACILITY

ZONING MAP

Comm.No. 68VC601

Pratt & Whitney A United Technologies Company / LEA



LEGEND

Drainage Boundary Line

Town Line

MAP REFERENCE:
THE SURFACE WATER AND GROUNDWATER QUALITY CLASSIFICATIONS USED HAVE BEEN ESTABLISHED BY THE CT DEP, AND ARE DEFINED IN THE CT DEP's NATURAL RESOURCES CENTER PUBLICATION "WATER QUALITY STANDARDS", ADOPTED JANUARY 1992, AND ON THE "WATER QUALITY CLASSIFICATIONS MAP", DATED FEBRUARY 1993.

2000 0 2000 4000 6000

SCALE IN FEET

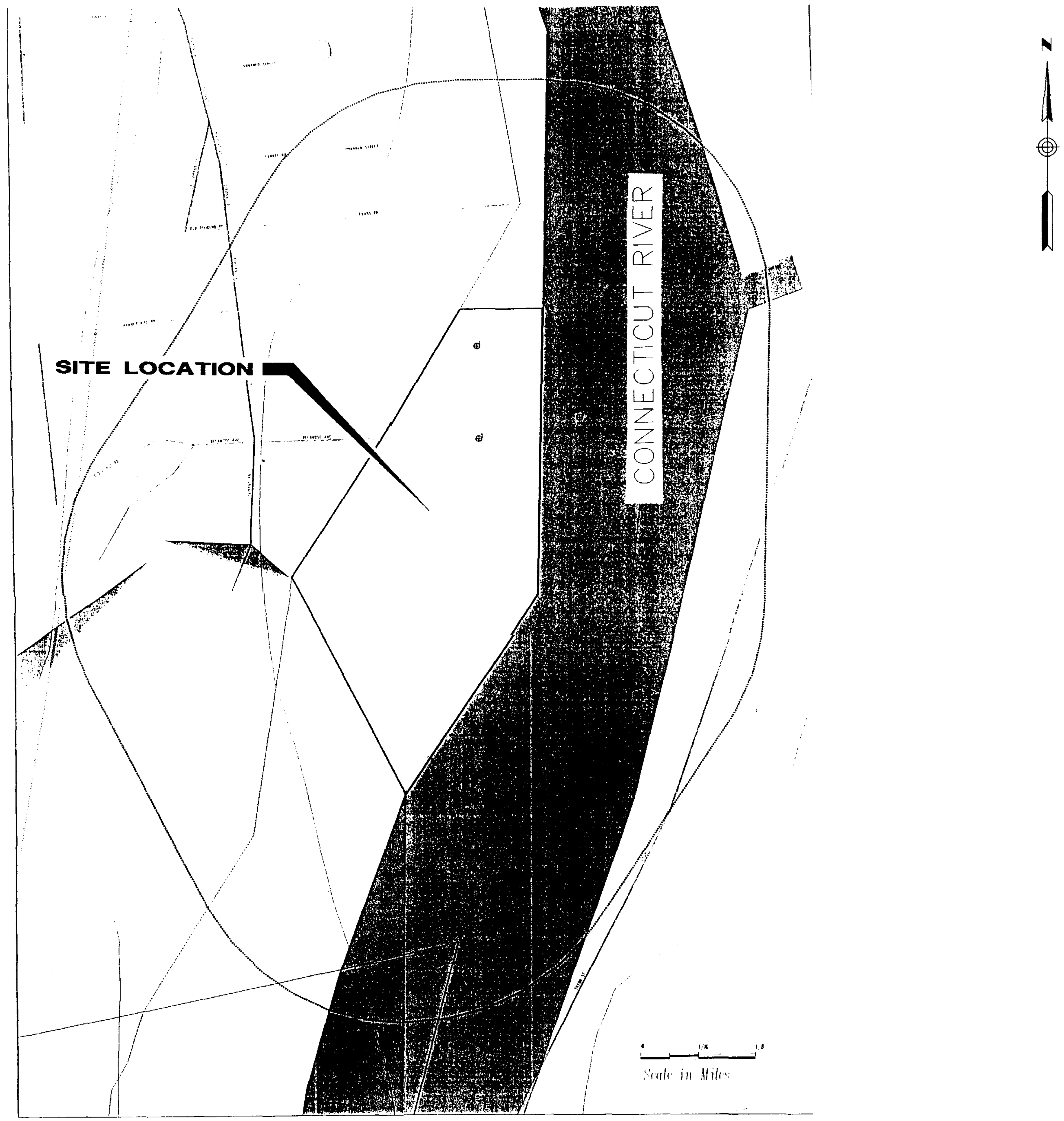
FIG. E-4

VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY ROCKY HILL FACILITY

WATER QUALITY CLASSIFICATION MAP

Comm.No. 68VC601

Pratt & Whitney A United Technologies Company / LEA



LEGEND

- ⊕ Well identified by EDR's Well search dated October 1996.
- ⬡ Public Well as reported in the "Atlas of the Public Water Supply Sources & Drainage Basins of Connecticut", dated June 1982.
- ——— Property line (approximate location)
- .... Search area based on approximate 1/4 mile buffer zone beyond property line.

MAP REFERENCE:
BASED ON DRAWING OBTAINED FROM ENVIRONMENTAL DATA RESOURCES, INC (EDR) AND FROM INFORMATION PRODUCED IN THE PUBLICATION ENTITLED, "ATLAS OF THE PUBLIC WATER SUPPLY SOURCES & DRAINAGE BASINS OF CONNECTICUT, DATED JUNE 1982.

FIG. E-5

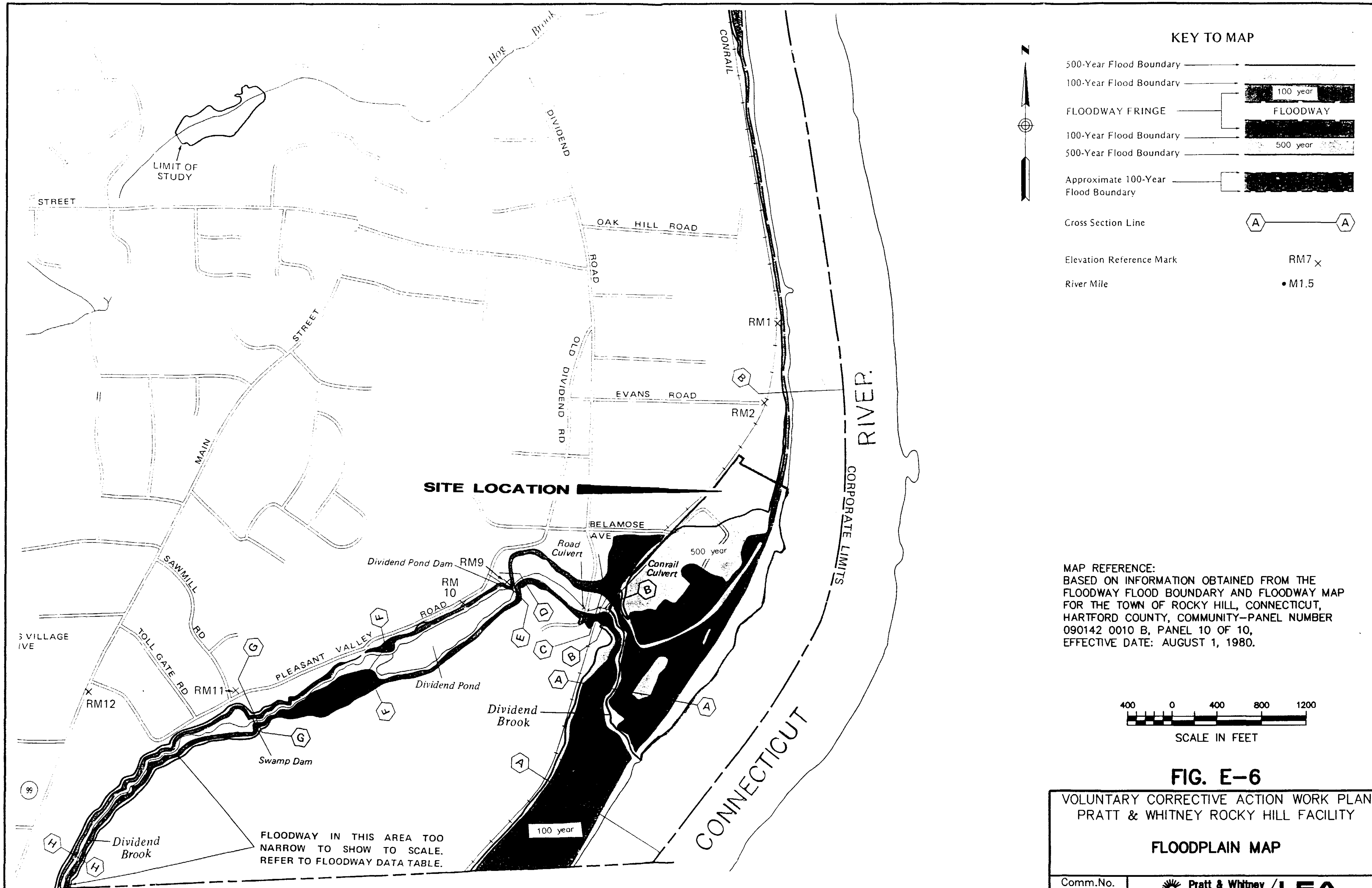
VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY ROCKY HILL FACILITY

WATER SUPPLIES

Comm.No. 68VC601

Pratt & Whitney A United Technologies Company / LEA

VRH-FIGS (1)



MAP REFERENCE:
BASED ON INFORMATION OBTAINED FROM THE FLOODWAY FLOOD BOUNDARY AND FLOODWAY MAP FOR THE TOWN OF ROCKY HILL, CONNECTICUT, HARTFORD COUNTY, COMMUNITY-PANEL NUMBER 090142 0010 B, PANEL 10 OF 10, EFFECTIVE DATE: AUGUST 1, 1980.

FIG. E-6

VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY ROCKY HILL FACILITY

FLOODPLAIN MAP

Comm.No. 68VC601

Pratt & Whitney A United Technologies Company / LEA

APPENDIX F
SOUTHINGTON MANUFACTURING FACILITY DESCRIPTION

November 22, 1996

Prepared by:

PRATT & WHITNEY
400 Main Street
East Hartford, Connecticut

In Association With:

LOUREIRO ENGINEERING ASSOCIATES
100 Northwest Drive
Plainville, Connecticut

LEA Comm. No. 68VC601

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FIGURES

TABLES

F1. SITE LOCATION AND DESCRIPTION

The Pratt & Whitney Southington Manufacturing facility, located on Aircraft Road in Southington, Connecticut, produced aircraft engine parts for commercial and military aircraft. Many industrial processes, such as forming, machining, milling, grinding, drilling, chemical and abrasive cleaning, degreasing, anodizing, and other surface preparations, were performed at this plant. All operations at the site were discontinued in July 1995, and the facility is currently vacant.

The facility consists of a main production building including approximately 814,000 square feet of manufacturing and office space, a separate power house, and several small ancillary structures located on approximately 52 acres of land. The facility location is shown on Figure F-1 which was constructed from the relevant portions of United States Geologic Survey (USGS) 7.5-minute topographic maps for the Bristol, Meriden, New Britain, and Southington, Connecticut quadrangles. A site plan is shown in Figure F-2.

Pratt & Whitney is the current owner of the Southington Manufacturing facility which includes the manufacturing facility and parking lots A, B, and C to the north of the facility.

F1.1 Site Use and Ownership

The facility was originally built in 1942 by the United States Navy for Pratt & Whitney=s use in the production of piston aircraft engines for use in the second world war. The facility was closed from late 1945 to late 1950. When the facility re-opened, the manufacturing operations were modified for the production of jet engine components as well as piston engines. Prior to construction of the facility, the area in the general vicinity was farmland or unused acreage. The property has been operated by Pratt & Whitney since 1942 and owned by Pratt & Whitney since 1956. The facility operated continuously from 1951 until September 1995 when all operations were discontinued. The facility is presently vacant and ownership is maintained by Pratt & Whitney.

F1.2 Review of Published Information

F1.2.1 City Directory Search

Where available, EDR reviewed Price & Lee's City Directories, at approximately five year intervals, from 1882 through 1965 for references to the subject site and surrounding properties. For the years 1882 through 1924, the directory did not reference properties by street address; only an alphabetical listing of property owners was given. From 1930 through 1949, there was no reference to the Southington Manufacturing site. For the year 1955, the site is listed as "Pratt & Whitney Aircraft Division Plant "S" (W. Queen Street)." For the years 1960 and 1965, the site is listed as a Pratt & Whitney Aircraft Division United Aircraft Corp. (W. Queen)."

No references to surrounding properties were found until a 1955 reference to GEMCO Manufacturing Company on West Queen Street. In the 1960 directory, there were references to three residences and the GEMCO Manufacturing Company on West Queen Street, and four residences and an apartment building on Queen Street West. The 1965 directory references nine residences, one apartment building, GEMCO Manufacturing Company, and the Owen Tool Manufacturing Company on West Queen Street four residences, one apartment building, a vacant store, and a restaurant on Queen Street West, and three residences and the Pizzitola's Electric Company on Newell Street.

F1.2.2 Fire Insurance Map Review

Database searches were performed to retrieve historical information available for the Pratt & Whitney, Aircraft Road facility in Southington, CT. A search performed by EDR Sanborn, Inc. (EDR) revealed that the Sanborn® fire insurance maps available for the Town of Southington do not provide areal coverage of the site.

F1.2.3 Topographic Map Review

EDR also conducted an historical topographic map search. The site is located on the USGS topographic map of the Bristol, Connecticut, quadrangle. EDR was able to locate five historic topographic maps of the Bristol quadrangle. The maps are from the years 1953, 1966, 1972, 1976, and 1984. In general, the maps show commercial and industrial development of the area. The facility outline remained essentially the same over that time period, with only minor additions of ancillary structures surrounding the main building.

F1.2.4 Aerial Photograph Review

A survey of aerial photographs available for the site was also performed by EDR. This review indicated that the oldest available photograph from readily available sources was from 1951. A color infrared photograph was reportedly available from 1986. The exact sources of the photographs were not reported, only the source code for the photographs, as available through National Aerial Resources, Inc. A more detailed review of the aerial photographs will be performed at a later date, as appropriate.

F2. ENVIRONMENTAL SETTING

F2.1 Land Use

The land within a 1000-foot radius of the facility is generally used for a mixture of commercial, industrial and residential purposes. The facility is located in an area zoned as heavy industry, as shown on Figure F-3, which was constructed from the Zoning Map of the Town of Southington, dated October 4, 1988.

The area to the north of the facility is zoned as I-1 and I-2 for light and heavy industry, respectively and consists mostly of unused land in the vicinity of the Quinnipiac River floodplain, some parking areas, and several small manufacturing facilities. The area to the south of the facility is zoned as I-1 for light industry and consists mostly of vacant land with some commercial facilities.

The area to the east of the facility is zoned as B for business, for a distance of approximately 500 feet from the facility's property line, and is occupied by a shopping mall and a considerable number of small commercial businesses. Between 500 feet and 1,000 feet from the property line, the area is zoned as R-12 for residential and B for business and contains a small housing development and several small commercial businesses. The area to the west of the facility is zoned as I-1 for light industry and includes a mobile home park bordering the Quinnipiac River.

F2.2 Groundwater and Surface Water Classifications

The DEP has adopted water quality classifications for the groundwaters and surface waters of the state to categorize the existing quality of the water, the potential uses of the water, allowable discharges to the water, and the long-term state goals for water quality restoration. Surface waters and groundwaters are classified separately, and both classification schemes are based on the water quality standards adopted by the DEP. The groundwaters and surface waters in the vicinity of the facility have been classified by the DEP, as shown on Figure F-4, which was constructed from the Water Quality Classification Map prepared by the Connecticut DEP and dated February 1993.

The DEP currently classifies groundwater at the site and in the vicinity as GA, denoting groundwaters that are presumed suitable for direct human consumption without the need for treatment. In the immediate vicinity of the facility's production wells (which are used for process water only), the ground water is classified as GAA, which is used to designate groundwater which is within the area of influence of community and non-community water supply wells.

In the vicinity of the facility, the Quinnipiac River is currently classified as C/B indicating a current surface water classification of C and a goal of B. Class C surface waters are suitable for fish and wildlife habitat, recreational boating, and certain industrial processes and cooling. The goal for these waters is Class B, designating waters that are suitable for bathing, other recreational purposes, agricultural uses, certain industrial processes and cooling and are an excellent fish and wildlife habitat and of good aesthetic value. The DEP policy for this watercourse is to maintain the quality, which is suitable for recreational purposes, serving as fish and wildlife habitat, and as a source of agricultural and industrial water.

F2.3 Water Supplies

A review of the "Atlas of the Public Water Supply Sources & Drainage Basins of Connecticut," published by the DEP and dated June 1982, identified several public drinking water supply wells within a one-mile radius around the facility. A review of available files maintained by the Town of Southington and the Town of Plainville also revealed several private water supply wells within a one-mile radius of the facility. A well search performed by EDR revealed the presence of several wells within the general area of the site as noted in Figure F-5. These wells represent the facility's production wells, the Forest Hills Mobile Home Park wells, and a residential well on Newell Street. Several private wells were also identified on Lanning Street, to the east of Queen Street (not shown in Figure F-5). It should be noted, however, that the presence of additional private water supply wells in the area cannot be precluded. The area to the north of the facility, beyond the Southington town line, is serviced by either the Plainville or Bristol Water Companies. The area to the south of the town line is serviced by private and public water wells and the Southington Water Company. The facility is supplied with municipal water by the Southington Water Company. The facility has at one time or another utilized seven production wells, located in the vicinity of the facility, to supply process water for facility operations.

F2.4 Floodplain Information

According to the Flood Insurance Rate Map (Community Panel No. 090037-0002-C, prepared by the Federal Emergency Management Agency and dated January 17, 1990 for Southington, Connecticut), the entire facility, situated at an approximate elevation of 170 feet mean sea level, is located outside of the projected 100-year floodplain, which is at an elevation of 163 feet above MSL. A portion of the floodplain map for the facility and the surrounding area is included on

Figure F-6. The entire facility, including all hazardous waste management areas, is situated at an approximate elevation of 170-feet mean sea level.

F2.5 Surface Water Drainage

The topography of the area in the vicinity of the facility is shown on the USGS topographic map included as Figure 1. This topographic map shows the facility buildings, elevation contours of the ground surface, roads, and surface waters. The Quinnipiac River flows southwestward approximately 1,100 feet west of the facility and then continues south along the base of Redstone Hill.

Some of the precipitation that falls on unpaved surfaces at P&W property infiltrates to recharge the groundwater. However, most of the P&W property is covered with pavement or man-made structures. Much of the precipitation that falls on these areas is channeled to catch basins which connect with the municipal storm sewer system. The storm sewers discharge surface runoff to the Quinnipiac River through a storm drainage system. The Quinnipiac River in the area of the site runs roughly north to south. There are no other permanent streams or bodies of surface water in the area.

The site includes one major drainage area encompassing the main facility, surrounding auxiliary buildings and portions of the parking lots, as well as, portions of Edward's Plaza located to the east of the facility. Stormwater from Edward's Plaza is entering the facility, combining with the facility's stormwater collection system and eventually discharges through discharge 008 into the Quinnipiac River.

F2.6 Regional Geology

The Pratt & Whitney Southington Manufacturing facility is located in the Quinnipiac River Valley in Southington, Connecticut. The Quinnipiac River, which flows southwestward approximately 1,100 feet west of the facility, is located in the Connecticut Valley Lowlands physiographic province.

The current geomorphology of the valley is chiefly the result of continental glaciation which modified the valley during a period ending approximately 10,000 years ago. Unconsolidated sediments within the valley were deposited predominantly by meltwater emanating from the retreating glacier. These included glaciofluvial materials deposited by meltwater streams and glaciolacustrine sediments deposited in the large glacial lake that formed in the valley.

Extensive thicknesses (up to 150 feet) of sediment accumulated in the glacial lake during its existence. Coarser material (sand and gravel) was deposited at the fringes of the lake and near tributaries which fed the lake (forming deltas). Fine material (silt and clay) accumulated on the lake bottom in areas away from the shorelines, tributaries, and other high energy areas of the lake. The resulting glaciolacustrine deposit contains a silt layer up to 150 feet thick which currently underlies much of the Quinnipiac River Valley from New Haven to Southington.

Valley train deposits generally overlie the glacial lake sediments in the Quinnipiac River Valley. Valley train deposits consist of sand and gravel which were deposited by streams of glacial meltwater. Variations in grain-size are attributed to deposition in narrow, shifting river channels in a braided stream environment.

The pro-glacial deposits in the Southington area generally exhibit a uniform stratigraphic succession with sand and gravel of the valley train deposits above the fine sand, silt, and clay of the glacial lake deposits. These glacial lake sediments were deposited directly on the bedrock or above a layer of glacial till or other stratified drift deposits. Thickness of the unconsolidated deposits may be as much as 150 to 170 feet or more in some portions of the valley.

Bedrock beneath the Quinnipiac River valley consists of a thick sequence of sedimentary and igneous rocks of late Triassic to early Jurassic age. The individual sedimentary rock formations, composed of conglomerates, sandstones, siltstones, and shales, are interbedded with units consisting of basaltic lava. These strata dip at approximately 10 to 45 degrees to the southeast towards the west-dipping normal border fault located approximately 14 miles east of the site.

F2.7 Site Geology

Previous environmental investigations conducted at the facility have identified four stratigraphic units in the unconsolidated deposits at the site. These units include an upper sand deposit, a layer of silt, a lower sand unit, and a glacial till that directly overlies bedrock. As with most glacial deposits, the generalized stratigraphy described above is not found uniformly beneath the site.

Upper Sand Layer: The upper sand unit, five to 18 feet thick, consists of fine to coarse, gray to light brown sand with lesser amounts of silt and gravel. This unit includes primarily fill and post-glacial alluvial deposits.

Silt Layer: A second unit, which consists of reddish-brown silt interbedded with varying amounts of fine sand and clay, lies beneath the upper sand unit. The silt unit, up to 135 feet thick, is composed predominantly of well-stratified silt with frequent lenses of fine sand or clay. Just north of the site, at the intersection of West Queen and Newell Streets, this silt layer is absent, where a glacial delta, composed of fine-to-coarse sand entered the glacial lake.

Lower Sand Unit: A lower sand unit, composed primarily of fine sand, is locally present beneath the silt unit.. Where this lower sand unit was encountered, it consisted of 1.5 to 45 feet of silty fine sand with frequent layers and lenses of medium and coarse sand.

Glacial Till: A layer of glacial till lies directly above the bedrock. The till is generally a dense, poorly sorted mixture of fine to coarse sand, gravel, and silt. Up to eight feet of till was reported in boring logs from the site.

Available information indicates that, the bedrock beneath the site consists of red sandstones and shales of the New Haven Arkose. Several borings completed on Pratt & Whitney property have been drilled to refusal, with three borings penetrating bedrock. The depth to bedrock beneath the site ranges from 100 feet to 148 feet. Just north of the site, at the intersection of West Queen and Newell streets, the depth to bedrock is 170 feet.

F2.8 Regional Hydrogeology

Regional groundwater flow patterns for the area are controlled largely by the topography and the configuration of the unconsolidated materials within the valley. Groundwater flow is generally from upland areas down into the valley, then regional groundwater flow follows the general trend of the valley, particularly in deeper zones of the aquifer.

The unconsolidated geologic units in the valley consist of layers of sand, silt and clay. The sand units constitute the principal aquifers of the site and vicinity. Silt and clay layers, with lower hydraulic properties, may form confining and semi-confining layers, where they are present.

The bedrock is also a potential aquifer capable of supplying low to moderately high quantities of groundwater. The upper surface of the bedrock is typically friable due to weathering and often conducts groundwater in a manner similar to an unconsolidated unit. Groundwater flow beneath this weathered zone is restricted to more isolated fractures. The bedrock is generally less permeable than the overburden. The median yield of bedrock wells installed in the Quinnipiac River valley has been reported to be approximately 10 gallons per minute.

F2.9 Site Hydrogeology

Groundwater flow directions and groundwater recharge and discharge areas in the vicinity of the site are largely controlled by the topography and overburden stratigraphy. The thickness, extent, and hydraulic conductivity of the silt layer will have a significant effect on groundwater flow in the intermediate and deep zones of the aquifer. In areas where this silt layer is present, the shallow and deep zones of the aquifer are separated by the silt layer, which is may act as an aquitard where it is present.

The uppermost zone of the aquifer, approximately 10 to 15 feet thick consists primarily of post-glacial alluvial sands and man-made fill overlying the glaciolacustrine silts. Historic groundwater flow patterns observed at the site have been influenced by pumping of the nearby Pratt & Whitney production wells. Site-wide groundwater data has not been collected since the production wells ceased operation in 1995; however, the assumed direction of groundwater flow in the shallow zone of the aquifer is generally toward the Quinnipiac River. Deeper groundwater flow is presumed to be down the Quinnipiac River valley, but flow in the intermediate and deeper zones of the aquifer has been influenced locally by pumping of production wells in the vicinity of the site.

With the production wells in operation, most of the groundwater in the shallow aquifer below the facility flowed toward the north and northwest. A hydraulic divide crossed the property south of the facility building. In the shallow aquifer, groundwater south of this divide, flowed toward the southwest and groundwater north of the divide flowed northward. Groundwater in the silt aquitard flowed in a westerly direction..

Head measurements in the shallow aquifer were as much as five feet greater than in the silt layer. These differences indicate that the potential exists for downward flow from the shallow aquifer to the silt aquitard. The degree of hydraulic connection between these and other zones of the aquifer has not been clearly determined.

F3. WASTE MANAGEMENT

F3.1 Facility Operations

Hazardous wastes were generated at this site by fabricating, cleaning, finishing, coating, testing, and research operations (Standard Industrial Classification (SIC) 3724). These hazardous wastes were typically water solutions, both concentrated and dilute, which contained acids, alkalies, and heavy metals. Spent solvents, waste paints, and waste oils were also generated, as well as waste aluminum sludge from surface finishing operations. As noted previously, all manufacturing activities at the site have been discontinued, and no waste is presently being generated.

Hazardous waste management activities at this site have historically included generation, storage in tanks and containers, and storage and treatment in surface impoundments. Treatment of hazardous wastes, principally rinsewaters from metal finishing operations on-site, occurred only in the National Pollutant Discharge Elimination System (NPDES)-permitted Industrial Wastewater Treatment Plant, which is excluded from the RCRA permitting requirements specified by 40 CFR Part 264.1(g)(6) and 40 CFR Part 270.1(c)(2)(v). Two surface impoundments were utilized for the storage and treatment of metal hydroxide sludge until 1982, when their use was discontinued. The surface impoundments were formally closed in 1984 under a DEP-approved RCRA Closure Plan. After 1982, the metal hydroxide generated in the Industrial Wastewater Treatment Plant was shipped to a permitted treatment/storage/disposal facility (TSDF) for disposal. The metal hydroxide sludge was collected in a five to eight cubic yard dumpsters and stored in the Industrial Wastewater Treatment Plant building, beneath the filter press, until shipped off the site for disposal. The Industrial Wastewater Treatment Plant operated under NPDES Permit No. CT 0001392.

F3.2 Waste Generation, Handling, and Characteristics

Pratt & Whitney maintained information on the various process solutions used at the facility. The individual components of these solutions were identified by process material control (PMC) or Pratt & Whitney (PW) numbers. Literature located near the operating areas provided descriptions and material specifications for each of the process solutions. These solutions were made on-site with virgin material (e.g., acids, alkalies, chromium compounds, and cyanides) and were analyzed on-site by the Material Control Laboratory while in use.

Solutions were discarded when they became too dilute, too concentrated, or could no longer adequately perform their designated function. The types of wastes generated at the facility are further described below. It should be noted that it is possible that other types of wastes than the ones listed below were generated historically at the facility, as for example the electrochemical machining sludge (ECM) generated from deburring operations.

- **Acids**

Pratt & Whitney used several acids in its production processes. The resulting acid wastes were spent acid-water solutions of varying concentrations. Acid wastes were pumped out of process tanks and into drums or transporters (portable tanks) and stored in the Hazardous Waste Storage Area until the waste was shipped to the East Hartford facility for treatment. Typical acids used at the facility included: hydrochloric, nitric, sulfuric, hydrofluoric, acid salts, mixed acids.

- **Alkalies**

Pratt & Whitney used several alkalies in its production process. The resulting alkali wastes were spent alkali-water solutions of varying concentrations. Alkali wastes were pumped out of process tanks and into drums or transporters and stored at the Chemical/Hazardous Waste Storage Building until the wastes were transported to East Hartford for neutralization. Typical alkalies used at the facility included: sodium bicarbonate, sodium hydroxide, potassium hydroxide, trisodium phosphate.

- **Oil/Solvent Mixtures**

Pratt & Whitney used solvents in degreasing operations thereby generating a waste oil/solvent mixture. Most of the 1,1,1-trichloroethane was reclaimed by distillation. Waste trichlorotrifluoroethane was sent to the Pratt & Whitney Main Street facility for shipment to a permitted TSDF. Still bottoms were ordinarily sent to Pratt & Whitney for disposal.

- **Solvents**

Pratt & Whitney used solvents in degreasing, cleaning, and laboratory operations thereby generating spent solvent wastes which were transported to Pratt & Whitney's Main Street facility for shipment to a permitted TSDF. Typical solvents used at the facility included: acetone, 1,1,1-trichloroethane, methyl ethyl ketone, stoddard solvent, turpentine, lacquer thinner, toluene, naphtha, mineral spirits, denatured alcohol, isopropyl alcohol, trichlorotrifluoroethane, triethylene glycol, mixed solvents.

- **Paints and Paint Solvents**

Pratt & Whitney used paints and the associated paint solvents in industrial and facility painting operations. Waste paints and paint solvents were disposed of at a permitted TSDF. Typical paints and solvents used at the facility included: metal, latex, and oil base paints, lacquer, turpentine, V.M.P. naphtha, lacquer thinner.

- **Laboratory Chemical and Commercial Chemical Products**

Pratt & Whitney had laboratory facilities which produced waste laboratory chemicals. In addition, Pratt & Whitney purchased many commercial chemical products for use in its plants. Some of these items became waste products through obsolescence or expired shelf life and were disposed of at a permitted TSDF. Typical laboratory chemicals used at the facility included: small quantities of commercial chemical products including resins, epoxies, chemical coatings, cleaners, lubricants, absorbents, and polymers.

- **Aluminum Coating Sludge**

Aluminum coating sludge was generated at the plant as a result of a diffused aluminum coating process. In this process, corrosion and heat resistant nickel alloys and corrosion resistant steels were coated with a mixture of aluminum powder and other metallic powders which were then diffused at high temperatures. The sludge was produced from the exit gas scrubber at the unit and was disposed off site. Similar type of wastes generated from Plasma Spray operations at the facility included chromium, cobalt, and nickel.

- **Metal Hydroxide Sludge**

The plant produced an industrial wastewater treatment metal hydroxide sludge from metal finishing operations. This waste was disposed of in an off-site permitted TSDF.

F3.3 Waste Disposal Practices

The hazardous wastes generated at the facility were disposed of either through the Pratt & Whitney Main Street facility, or through commercial waste disposal facilities. The following waste types were transported to the Pratt & Whitney Main Street facility: concentrated acid solutions, concentrated alkali solutions, concentrated chromium solutions, and solvents. Paints and waste paints, laboratory chemicals and commercial chemical products, and F006 (metal hydroxide sludge) were shipped to the Pratt & Whitney Main Street facility or to a commercial treatment, storage, and disposal facility for final disposition. Waste wax/solvent and oil/solvent mixtures were sent to Pratt & Whitney East Hartford facility and then reclaimed.

Prior to 1982, the F006 metal hydroxide sludge was allowed to settle in two surface impoundments located in the southwestern corner of the facility property. The settled sludge was disposed of off-site at a permitted facility.

In December 1982, the dilute industrial wastewater treatment plant at the facility was upgraded with the addition of a Lamella®-type clarifier, and the use of the surface impoundments was discontinued. The remaining F006 wastes and contaminated soil were removed from the surface impoundments in July 1983, and the area was backfilled in May 1984. Closure of the surface impoundments was approved by the DEP in December 1984. The dewatered sludge from the clarifier was hauled off-site as a hazardous waste (F006) to a permitted facility for final disposal.

F4. SUMMARY OF EXISTING CONDITIONS

F4.1 Regulatory Status

Pratt & Whitney filed its original Notice of Hazardous Waste Activity for the Southington Manufacturing Facility, on August 13, 1980. This was followed with a Part A application on November 19, 1980

On November 7, 1988, a RCRA Part B Permit Application was submitted to the DEP but has not been approved. A Post-Closure Part B Permit Application was submitted to the regulatory agencies in June 1991, in response to a permit call issued jointly by the DEP and EPA, but has not been approved as of the date of this report.

According to EDR, the site is listed in the Resource Conservation and Recovery Information System (RCRIS) database as both a large quantity generator and a transport, storage or disposal facility. The site was also listed as having one compliance evaluation on April 22, 1992, and a compliance groundwater monitoring evaluation on August 14, 1984.

The facility is also listed in the State Hazardous Waste Sites (SHWS) database as having discharged chromium to the ground from a leaking tank and as having RCRA lagoons "cleaned out" in 1984. According to EDR, there were three removed underground storage tanks (USTs) listed for the site in the Connecticut Underground Storage Tank database.

F4.2 Known Releases

Several sources were reviewed to identify previous spills that have occurred at the site. According to EDR, the State Hazardous Waste Sites database listed the release of chromium to groundwater from the RCRA surface impoundments, and cited them as "cleaned out" in 1984.

A search of the electronic database maintained by the Oil & Chemical Soils Division of the DEP did not identify any spills at the facility. A survey of the hard copy files maintained by the same identified several spills, at the facility. However, an extensive record search has not been performed.

F4.3 Facility Investigations

A Current Assessment Summary was prepared in February 1991 for the facility summarizing soil/gas background information such as historical site use, hydrogeologic conditions, previous work by others, current site operations, and information on the quality of the soil and groundwater at the site. A soil gas survey was conducted at the site in February and March 1991 to delineate the extent of volatile organic compound (VOC) contamination at the facility.

Extensive facility investigations have been performed in accordance with the "Work Plan; Initial Characterization and Sampling; Pratt & Whitney, Southington Manufacturing Division, Aircraft Road", dated August 30, 1994. Environmental Units (including SWMUs, AOCs, and environmental items such as miscellaneous equipment pits and degreasers) were investigated. The units investigated are summarized in Table F-1.

F4.4 Identification of Environmental Units

The facility submitted a response to a Corrective Action Information Request to the EPA in 1985. A revised response was submitted on March 16, 1988, identifying four SWMUs at the facility: former surface impoundments, interim status hazardous waste storage building, former sanitary sewage filter beds, and former document incinerator. Since 1988, Pratt & Whitney identified additional SWMUs and AOCs in the Current Assessment Summary (February 1991) and the Post-Closure Part B Permit Application (June 1991). A complete list of the SWMUs, AOCs and environmental items identified at the facility is provided in Table F-1.

F4.5 Remediation Activities

The interim measures performed at the facility were associated with the regulated units at the facility (Former Oil House, Suspended Waste Storage Tanks, and Underground Waste Oil Storage Tank). The activities performed in these units prior to formal closure are outlined below:

F4.5.1 Former Oil House

- All hazardous wastes remaining in the former oil house were removed for disposal at permitted TSDF.
- All visible residue on the concrete base of the area was swept up and placed into containers for disposal off the site.
- The area was visually inspected for any residual contamination and to confirm that no spills had occurred. This inspection focused on identifying any discolored or stained areas. No discolored areas were reported.
- After the completion of the visual inspection, the concrete base was manually washed with municipal water.

- The concrete base was re-inspected for any discoloration or stains. None were reported, and the area was considered to be clean and fit for use.
- The concrete floor from most of the area was removed, and the subsurface soils were excavated to 10 feet (approximately 70 cubic yards) in order to install a new machine foundation. A portion of the floor area of the former oil house was left intact during the excavation. This area was at the entrance to the former oil house.
- Based on field screening results, no subsurface contamination was reported by visual or olfactory methods during the excavation of the concrete floor and the underlying soils. The excavation was filled with new fill material to approximately 5 feet and a 5-foot thick concrete pad foundation was installed for a shock-sensitive machine.

F4.5.2 Suspended Waste Storage Tanks

- All wastes and waste residues were removed from the tanks and any connecting piping. The wastes were placed in containers and disposed of off the site.
- The tanks were removed from the ceiling and cut open. Connecting piping was also removed at the time. All residues inside the tanks were removed and placed in containers. The decontamination of the tanks and piping consisted of thoroughly wiping the exposed surfaces with rags and absorbents. The rags and absorbents were collected, placed into containers, and disposed of off the site.
- Upon completion of the tank removal operation, the area was inspected, and no contamination was reported. The tanks were disposed of as scrap metal.

F4.5.3 Underground Waste Oil Storage Tank

- All wastes and waste residues were removed from the tank and any connecting piping.
- When the waste and waste residue were removed, the tank and connecting piping was excavated and broken into rubble.
- All portions of the concrete tank and associated piping were removed and disposed of off the site. The soils underlying the tank were visually inspected, sampled, and analyzed for volatile organic compounds and hydrocarbon contamination. No contamination was observed, and the hole was backfilled with the excavated soil

TABLES

Table F-1
IDENTIFICATION OF ENVIRONMENTAL UNITS
Southington Manufacturing Facility
Southington, Connecticut

EU ID	SWMU or AOC ID	Name	Description
EU 1	SWMU 1	Interim Status Hazardous Waste Storage Area and, what was, the Former Hazardous Waste Storage Area.	Waste solvents (TCA, methylene chloride), waste acids, lubricating oils, paint spray booth residues and waste alkalis were/are stored in this area. A soil gas survey which was conducted in this area indicates the potential of VOC-contaminated soils and/or groundwater.
EU 2	AOC 1	Former Underground Storage Tank Farm and Transfer Pump Area.	Historically, TCA and TCE were stored in underground tanks at this location. Currently TCA and hydraulic oil are stored in this location. Monitoring wells in this area indicate high concentrations of TCE and TCA in ground water. In addition, the soil gas survey that was conducted in this area indicates the presence of VOC contamination in the soil and/or groundwater.
EU 3	AOC 2	Former Drum Storage Area 1	Aerial photographs indicate that drums were stored in various locations in this area over time. The type of material stored in these drums (if any) is unknown. The soil gas survey which was conducted in this area indicated that there are two potential "hot spots". One area is located near the DEP 50 Storage building and the other is located just west of the sand storage area. Site personnel indicate that fire training may have been performed in the vicinity of the sand storage area.
EU 4		Former Loading Rack & Transfer Piping.	This area, which is located in the vicinity of the Former Underground Storage Tanks (see EU 2 above), is reported to be the location of the transfer piping used to off-load solvents to the underground tanks. The soil gas survey, which was conducted in this area, indicates the presence of VOC-contaminated soils and/or ground water.
EU 5		Garage	The soil gas survey which was conducted in this area indicates the presence of low levels of VOC soil and/or groundwater contamination.
EU 6	AOC 6	Solvent Distillation Units	TCA, TCE, PCE and methylene chloride were are distilled and recycled in this area. Solvents from the stills are discharged to a sump. Reclaimed solvent from the TCA still is piped directly to the 10,000-gallon TCA tank. The soil gas survey that was conducted in this area indicates that there is the potential for VOC-contaminated soil and/or groundwater.
EU 7	AOC 7	Chip Well	This area consists of a sump which collects solvent and oils which drip from the dumpsters containing metal cuttings and chips. The soil gas survey which was conducted in this area indicates that there is the potential for VOC-contaminated soil and/or groundwater.

Table F-1 IDENTIFICATION OF ENVIRONMENTAL UNITS Southington Manufacturing Facility Southington, Connecticut			
EU ID	**SWMU or AOC ID**	**Name**	**Description**
EU 8	SWMU 5	Former Temporary Solvent Storage Area	This area was used temporarily for storage of waste materials during construction of the Interim Status Storage Facility. A soil gas survey which was conducted in this area indicates that there is a potential for VOC-contaminated soil and/or groundwater in this area. Soil gas results indicated very low concentrations.
EU 9	AOC 8	Former Empty Drum Storage Area	This area is located in the vicinity of the Former Temporary Solvent Storage Area. The soil gas survey which was conducted in this location showed low concentrations of VOCs in the soil gas. There is the potential for low-level VOC contamination in the soils and/or ground water.
EU 10	AOC 3	Former Drum Storage Area 2	Aerial photographs indicate that drums were stored at various locations in this area over time. This area is located near EUs 8 and 9, which are discussed above. The types of material stored in these drums is not known. The soil gas survey which was conducted in this area indicated the potential presence of VOC-contaminated soil and/or groundwater.
EU 11	AOC 4	Fuel Oil Storage Area	No. 6 fuel oil is/was stored in two aboveground storage tanks. Fuel oil is/was pumped to the power house through underground lines. The soil gas survey which was conducted in this area did not indicate the presence of VOC contamination.
EU 12	AOC 5	Industrial Wastewater Treatment Facility	Dilute process wastewaters from acid and alkali cleaning, etching, and surface preparation are treated in this area. The soil gas survey did not indicate the presence of VOC-contaminated soils and/or groundwater in this area.
EU 13	SWMU 3	Former Sanitary Sewage Filter Beds	The filter beds were located in the southwestern corner of site. The surface impoundments were later constructed over the western portion of the filter beds. The soil gas survey did not indicate the presence of soil and/or groundwater contamination.
EU 14	SWMU 4	Former Document Incinerator	Confidential paper documents from the facility were destroyed in this unit. No other wastes, of any description, were burned in the incinerator. The soil gas survey which was conducted in this area indicates the potential for low level VOC contamination in soils and/or groundwater.
EU 15	SWMU 6	Wastewater-Soluble Oil Storage Tank	This tank is located in the same area as the solvent distillation units. The soil gas survey indicates the presence of VOC contamination in the soils and/or groundwater.
EU 16	SWMU 7	Former Chromium Wastewater Tank	This in-ground tank was/is located on the western side of the plant and was used for the storage of chromium wastewater.

Table F-1
IDENTIFICATION OF ENVIRONMENTAL UNITS
Southington Manufacturing Facility
Southington, Connecticut

EU ID	SWMU or AOC ID	Name	Description
EU 17		Former Zyblo and Waste Soluble Oil Storage Tanks	Interior aboveground bulk tanks
EU 18		Former Solvent Distillation Units	Distillation units for chlorinated solvents and drum storage
EU 19		Detrex Degreaser in Pit	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU 20		Detrex Degreaser in Pit	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU 21		Detrex Degreaser in Pit	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU 22		2-Degreasers (Detrex)	Degreaser station utilizing chlorinated solvents. Tank installed in pits.
EU 23		Detrex Degreaser in Pit	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU 24		Pickle Line & Clean/Chrome Line Pits & Containment & Degreaser	Chemical tanks containing aqueous solutions and a degreaser in pit(s).
EU 25		Tank Line Pit with Chrome Treatment Units & Degreaser	Chemical tanks containing plating solutions in pit below grade and a degreaser in a pit.
EU 26		Detrex Degreaser	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU 27		Vapor Degreaser	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU 28		Detrex Ultrasonic Cleaner	Ultrasonic cleaning of metal parts using chlorinated solvents
EU 29		Alkali Clean Line	Chemical tanks in pit(s).
EU 30		FPI Line Pit	Fluorescent penetrant inspection process line. Liquid tanks above slab.
EU 31		LaPointe Broach Pit	Oil reservoir in pit
EU 32		Corrosive Solvent Tank	Chemical tank possibly in a pit

Table F-1
IDENTIFICATION OF ENVIRONMENTAL UNITS
Southington Manufacturing Facility
Southington, Connecticut

EU ID	SWMU or AOC ID	Name	Description
EU-33		Heyligenstaedt Lathe (with pit)	Lathe with an associated oil reservoir in a pit
EU-34		Vapor Degreaser (in pit)	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-35		Chemical (Acid)Storage Area	Storage of various acids on a concrete slab
EU-36		Detrex Ultrasonic Degreaser	Ultrasonic cleaning of metal parts using chlorinated solvents
EU-37		Detrex Degreaser (in pit)	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-38		Detrex Degreaser	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-39		Sethco Chrome Reduction Unit	Tank with a mixer used for chrome reduction and pH adjustment
EU-40		Battery Charging Station with DWWSump (ASRSArea)	Battery charging station, sulfuric acid used
EU-41		Add Battery Maint. Area	Battery charging station, sulfuric acid used
EU-42		Relocate Battery Maint. Area	Battery charging station, sulfuric acid used
EU-43		Detrex Degreaser(in pit)	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-44		Detrex Degreaser(in pit)	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-45		Detrex Degreaser(in pit)	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-46		Detrex Degreaser (in pit)	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-47		Spin Test Rig	Oil reservoir in pit
EU-48		Clean/Strip Tank Line	Clean line consisting of a series of chemical tanks in pits
EU-49		Lapointe Broach Machine	Oil reservoir in pit

Table F-1
IDENTIFICATION OF ENVIRONMENTAL UNITS
Southington Manufacturing Facility
Southington, Connecticut

EU ID	SWMU or AOC ID	Name	Description
EU-50		Lapointe Broach Machine	Oil reservoir in pit
EU-51		Lapointe Broach Machine	Oil reservoir in pit
EU-52		Penetrant Syst.	Fluorescent penetrant inspection. Liquids in tanks above grade
EU-53		Clean Line	Clean line consisting of a series of chemical tanks in pit(s).
EU-54		Ultrasonic Degreaser	Ultrasonic cleaning of metal parts using chlorinated solvents
EU-55		Branson Ultrasonic Degreaser	Ultrasonic cleaning of metal parts using chlorinated solvents
EU-56		Hazardous Waste Area	Storage of hazardous waste in containers and portable tanks
EU-57		Detrex Degreaser(in pit)	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-58		Sutton Mach.Waste Water Trt.Syst. & Centrifuges	Deburring wastewater in inground concrete tanks.
EU-59		Added Oil House	Storage and distribution of oils and solvents
EU-60		Detrex Degreaser(in pit)	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-61		Detrex Degreaser(in pit)	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-62		LaPointe Broachwith pit	Oil reservoir in pits
EU-63		LaPonte Broachwith pit	Oil reservoir in pits
EU-64		Vapor Degreaser (in pit)	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-65		Detrex Degreaser(in pit)	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-66		Zyglo Line Tanks(in pit)	Fluorescent penetrant inspection using zyglo. Penetrant tank in pit
EU-67		Zyglo Tank(in pit)	Fluorescent penetrant inspection using zyglo. Penetrant tank in pit
EU-68		Zyglo Tank(in pit)	Fluorescent penetrant inspection using zyglo. Penetrant tank in pit

Table F-1
IDENTIFICATION OF ENVIRONMENTAL UNITS
Southington Manufacturing Facility
Southington, Connecticut

EU ID	SWMU or AOC ID	Name	Description
EU-69		Magna Flux Tank Line (in pit)	Chemical Tanks in Pit(s)
EU-70		Acid Crib	Atorage and distribution of acids
EU-71		Detrex Degreaser(no pit)	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-72		Blue Etch AnodizeLine	Chemical Tanks in Pit(s)
EU-73		Detrex Degreaser(in pit)	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-74		Detrex Degreaser(in pit)	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-75		Acid Storage Area	Used for acid storage on a concrete slab
EU-76		Varsol Tank(no pit)	Used aromatic solvents
EU-77		Anodize Etch Line	Chemical Tanks in Pit(s)
EU-78		Detrex Degreaser	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-79		Chromic Acid Tank	Chemical Tank in Pit
EU-80		Anodize Etch Lines(pit)	Chemical Tanks in Pit(s)
EU-81		FPI System(pit)	Fluorescent penetrant inspection. Penetrant Tank in Pit
EU-82		LaPointe Broach(with pit)	Oil reservoir in pit
EU-83		LaPointe Vert.Broach (with pit)	Oil reservoir in pit
EU-84		BlakesleeDegreaser (in pit)	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-85		Coolant ClarifierSyst. (in pit)	Used coolants in above grade tanks.
EU-86		LaPointe Broach(with pit)	Oil reservoir in pit

Table F-1
IDENTIFICATION OF ENVIRONMENTAL UNITS
Southington Manufacturing Facility
Southington, Connecticut

EU ID	SWMU or AOC ID	Name	Description
EU-87		Detrex Degreasers(in pit)	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-88		Coolant ClarifierSyst. (in pit)	Used coolants in above grade tanks.
EU-89		Blakeslee Degreaser (in pit)	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-90		Shipping/ReceivingTruck Well #2 OilSump/Elev.	Truck well with oil sump
EU-91		Detrex Degreaser with Platform	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-92		Steam Booth	Below grade pit for collection of condensate
EU-93		LaPointe Broach(with pit)	Oil reservoir in pit
EU-94		10,000 Gallon Fuel Tank	Underground fuel oil tank
EU-95		Truck Lift	Buried oil reservoir
EU-96		Truck Lift	Buried oil reservoir
EU-97		Battery Charging &Wash Area	Sulfuric acid used in battery maintenance
EU-98		Degreaser with pit	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-99		Degreaser with pit	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-100		Degreaser with pit	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-101		Two-Degreasers in pit	Degreaser station utilizing chlorinated solvents. Tanks installed in pits.
EU-102		Degreaser in pit	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-103		Degreaser in pit	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-104		Degreaser in pit	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.

Table F-1 IDENTIFICATION OF ENVIRONMENTAL UNITS Southington Manufacturing Facility Southington, Connecticut			
EU ID	**SWMU or AOC ID**	**Name**	**Description**
EU-105		Detrex Degreaser in pit	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-106		Chrome Pickle Line Pit	Chemical tanks in pit(s).
EU-107		Degreaser in Pit	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-108		Detrex Degreaser in pit	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-109		Degreasers in Pits	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-110		Degreasers in Pits	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-111		Degreasers in Pits	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-112		Plating Line Furnace Pit	Plating operations in this area included: lead, copper, chrome, cadmium, silver, Chemicals included: cyanides, acids, alkalies
EU-113		Degreaser Pit	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-114		Degreaser Pit	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-115		Trench	Trenches in plating area for collection of liquid wastes
EU-116		Trench	Trenches in plating area for collection of liquid wastes
EU-117		Degreaser Pit	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-118		Furnace Pit	Pit in close proximity to plating lines
EU-119		Degreaser Pit	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-120		Furnace Pit	Pit in close proximity to plating lines.
EU-121		Degreaser Pit	Degreaser station utilizing chlorinated solvents. Tank installed in a pit.
EU-122		Levelator Pit	Buried oil reservoir for lift
EU-123		Levelator Pit	Buried oil reservoir for lifts
EU-124		Degreaser Pit	Degreaser station utilizing solvents. Tanks installed in a pit.
EU-125		Reline Pit	

FIGURES

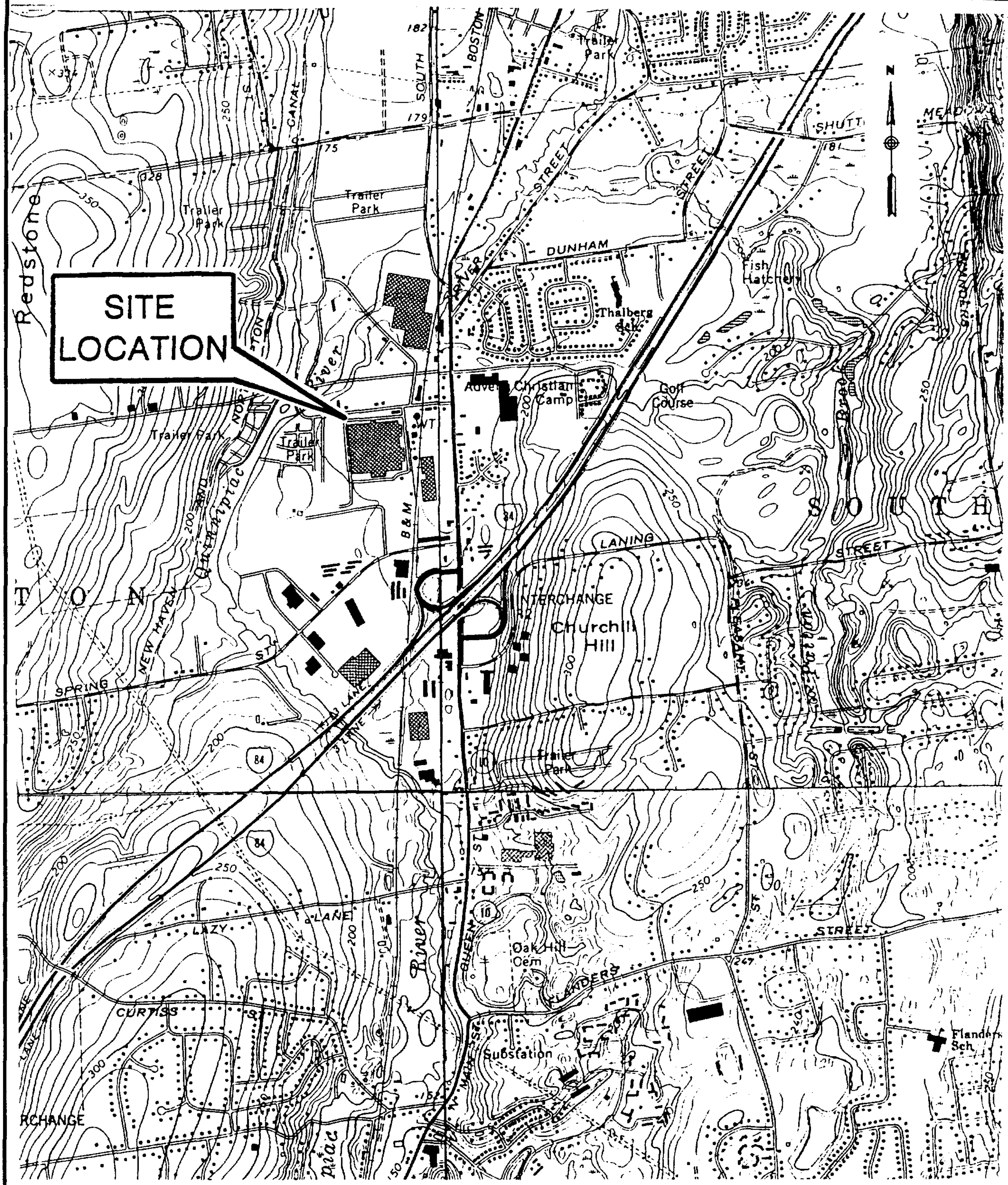


FIG. F-1

MAP REFERENCE:
USGS 7.5 MINUTE SERIES QUADRANGLES
FOR NEW BRITAIN, MERIDEN, SOUTHINGTON
AND BRISTOL, CONNECTICUT.

1000 0 1000 2000 3000

SCALE IN FEET

VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY SOUTHINGTON MFG. FACILITY

USGS TOPOGRAPHIC MAP

Comm.No. 68VC601	Pratt & Whitney A United Technologies Company / LEA

VSM-FIGS (1)

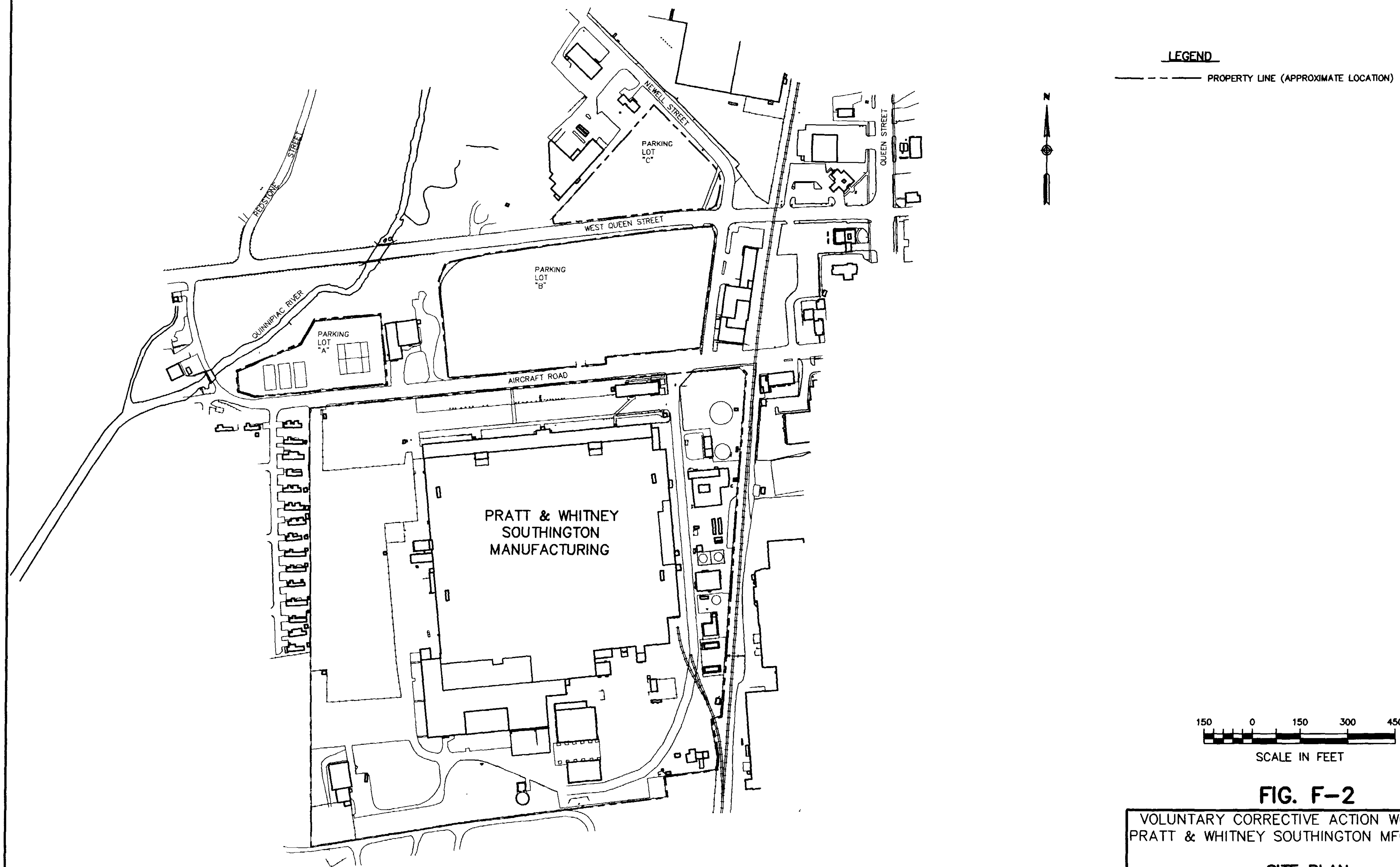
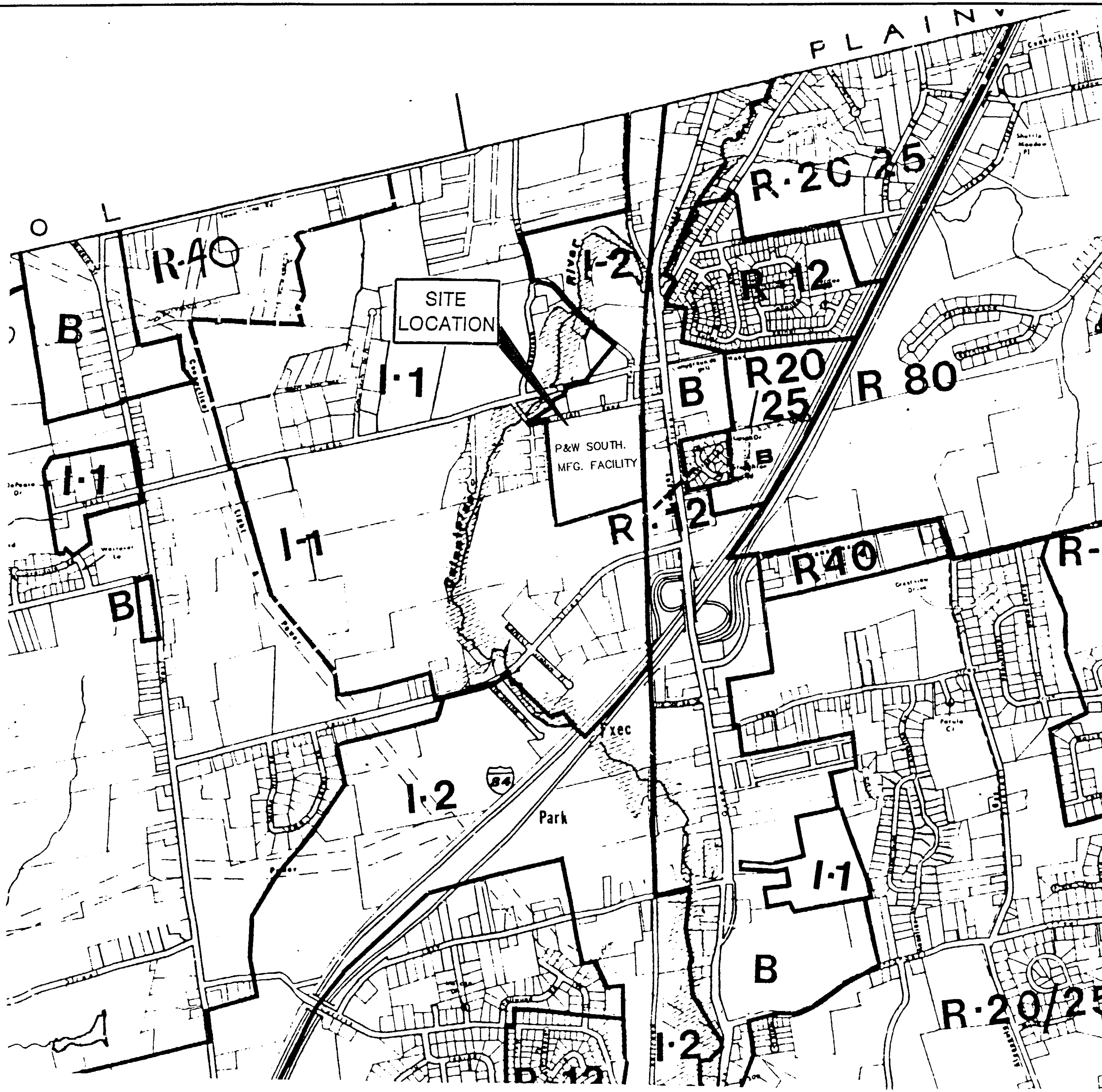


FIG. F-2

VOLUNTARY CORRECTIVE ACTION WORK PLAN PRATT & WHITNEY SOUTHINGTON MFG. FACILITY SITE PLAN	
Comm.No. 68VC601	Pratt & Whitney A United Technologies Company / LEA

VSM-F-2 (300)



N

LEGEND

R80	=	Residential	80,000 sq. ft.
R40	=	Residential	40,000 sq. ft.
R20/25	=	Residential	22,500 sq. ft.
R12	=	Residential	12,000 sq. ft.
CB	=	Central Business	8,000 sq. ft.
B	=	Business	20,000 sq. ft.
I–1	=	Light Industry	40,000 sq. ft.
I–2	=	Heavy Industry	120,000 sq. ft.
RO	=	Residential/Office	
(pattern)	=	Floodplain District	

MAP REFERENCE:
BASED ON INFORMATION OBTAINED FROM THE ZONING MAP OF SOUTHINGTON, CONNECTICUT EFFECTIVE DATE OCTOBER 4, 1988.

750 0 750 1500 2250
SCALE IN FEET

FIG. F–3

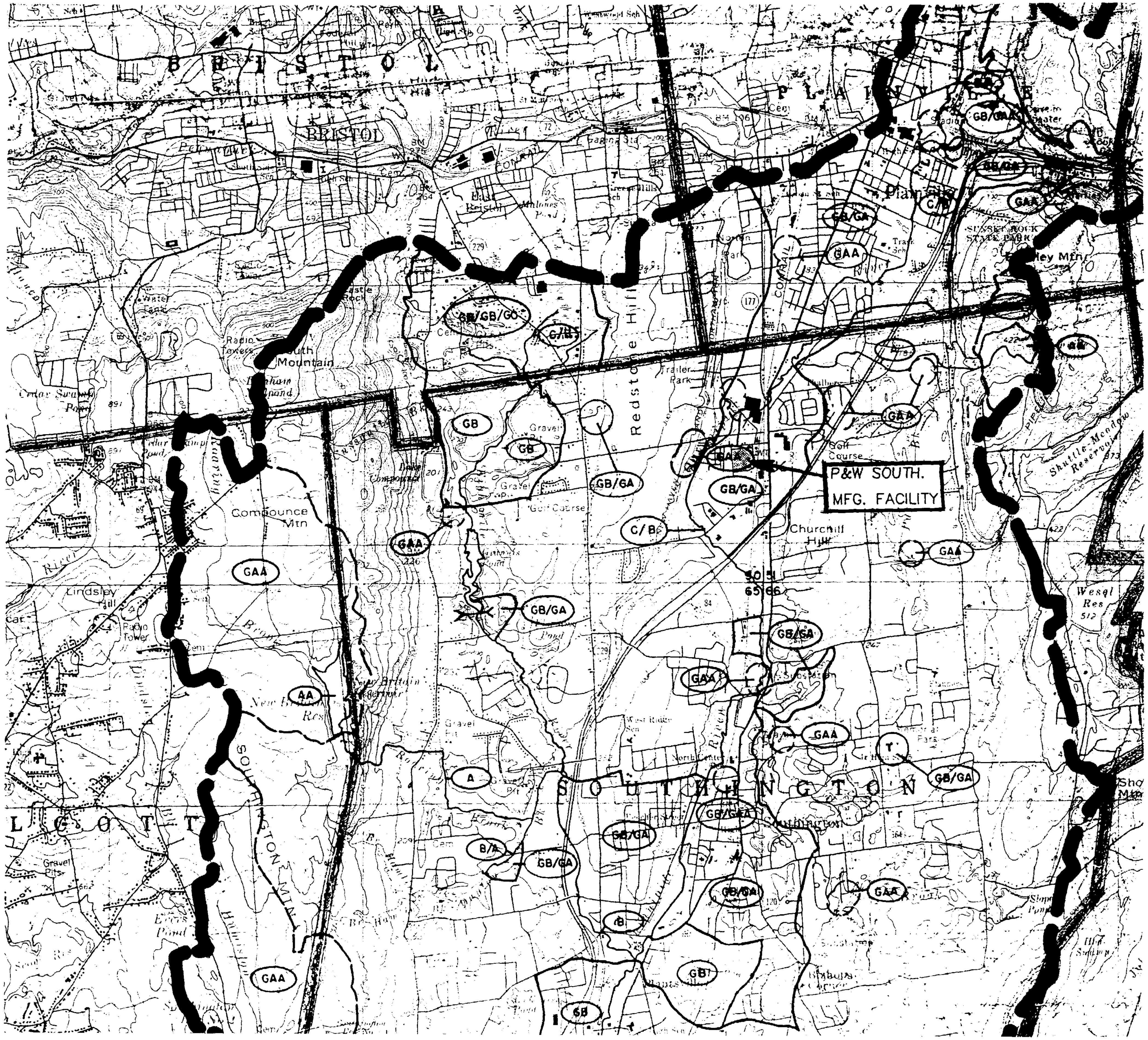
VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY SOUTHINGTON MFG. FACILITY

ZONING MAP

Comm.No. 68VC601

Pratt & Whitney
A United Technologies Company
/LEA

VSM-FIGS (1)



LEGEND

PW2,PROCESS,(A)	Process Well PW2, Active
3,PUBLIC,(I)	Public Supply WELL 3, Inactive
	Drainage Boundary Line
	Town Line

MAP REFERENCE:
THE SURFACE WATER AND GROUNDWATER QUALITY CLASSIFICATIONS USED HAVE BEEN ESTABLISHED BY THE CT DEP, AND ARE DEFINED IN THE CT DEP's NATURAL RESOURCES CENTER PUBLICATION "WATER QUALITY STANDARDS", ADOPTED JANUARY 1992, AND ON THE "WATER QUALITY CLASSIFICATIONS MAP", DATED FEBRUARY 1993.

2000 0 2000 4000 6000
SCALE IN FEET

FIG. F-4

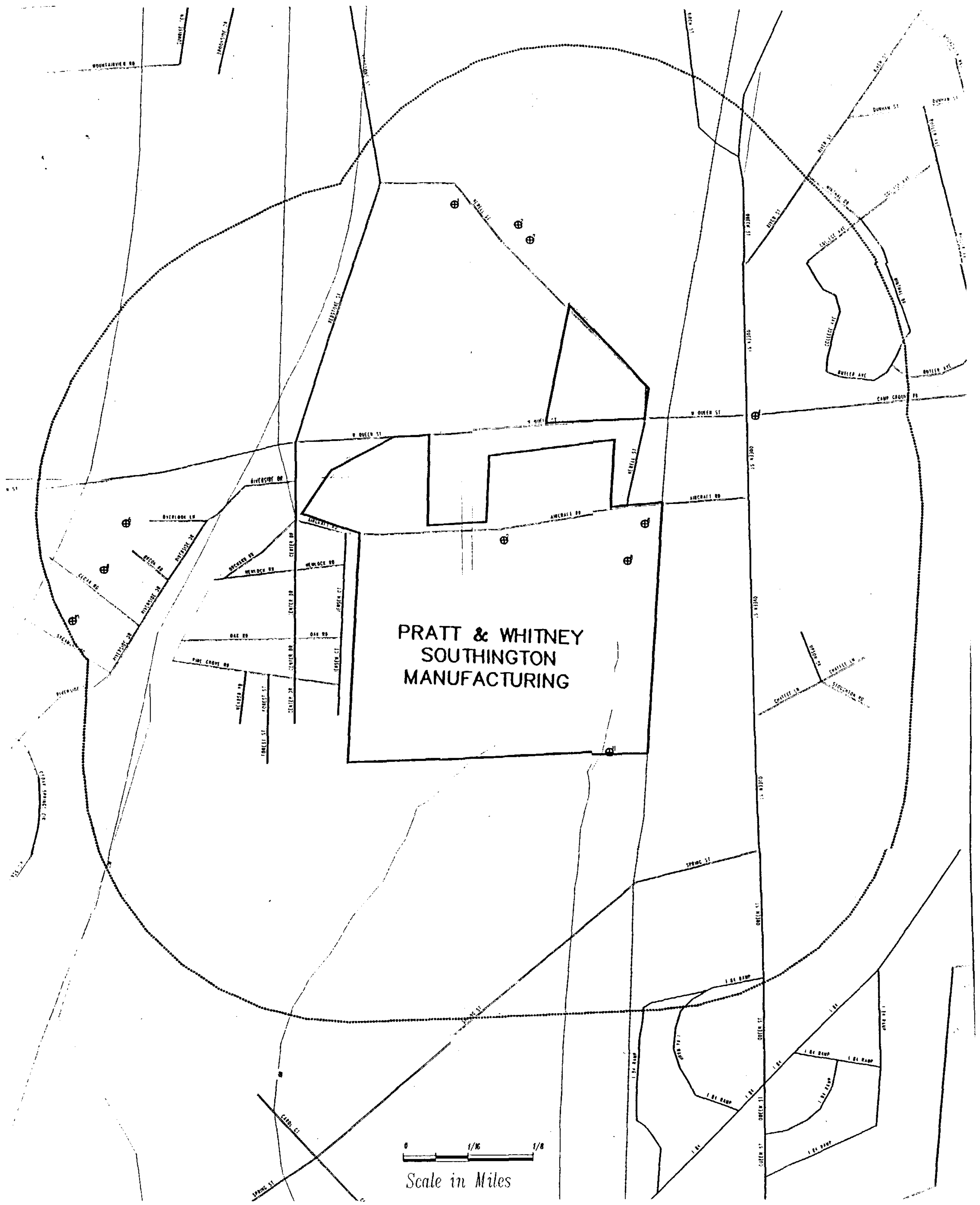
VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY SOUTHINGTON MFG. FACILITY

WATER QUALITY CLASSIFICATION MAP

Comm.No. 68VC601

Pratt & Whitney A United Technologies Company / LEA

VSM-FIGS (1)



LEGEND

- Well identified by EDR's Well search dated October 1996.
- Public Well as reported in the "Atlas of the Public Water Supply Sources & Drainage Basins of Connecticut", dated June 1982.
- Property line (approximate location)
- Search area based on approximate 1/4 mile buffer zone beyond property line.

MAP REFERENCE:
BASED ON DRAWING OBTAINED FROM ENVIRONMENTAL DATA RESOURCES, INC (EDR) AND FROM INFORMATION PRODUCED IN THE PUBLICATION ENTITLED, "ATLAS OF THE PUBLIC WATER SUPPLY SOURCES & DRAINAGE BASINS OF CONNECTICUT, DATED JUNE 1982.

FIG. F-5

VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY SOUTHINGTON MFG. FACILITY

WATER SUPPLIES

Comm.No.
68VC601

Pratt & Whitney
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VSM-FIGS (1)

LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

ZONE A	No base flood elevations determined.
ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE A99	To be protected from 100-year flood by federal flood protection system under construction; no base flood elevations determined.
ZONE V	Coastal flood with velocity hazard (wave action); no base flood elevations determined.
ZONE VE	Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE VE	Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas of less than 1 square mile; and areas protected by levees from 100-year flood.

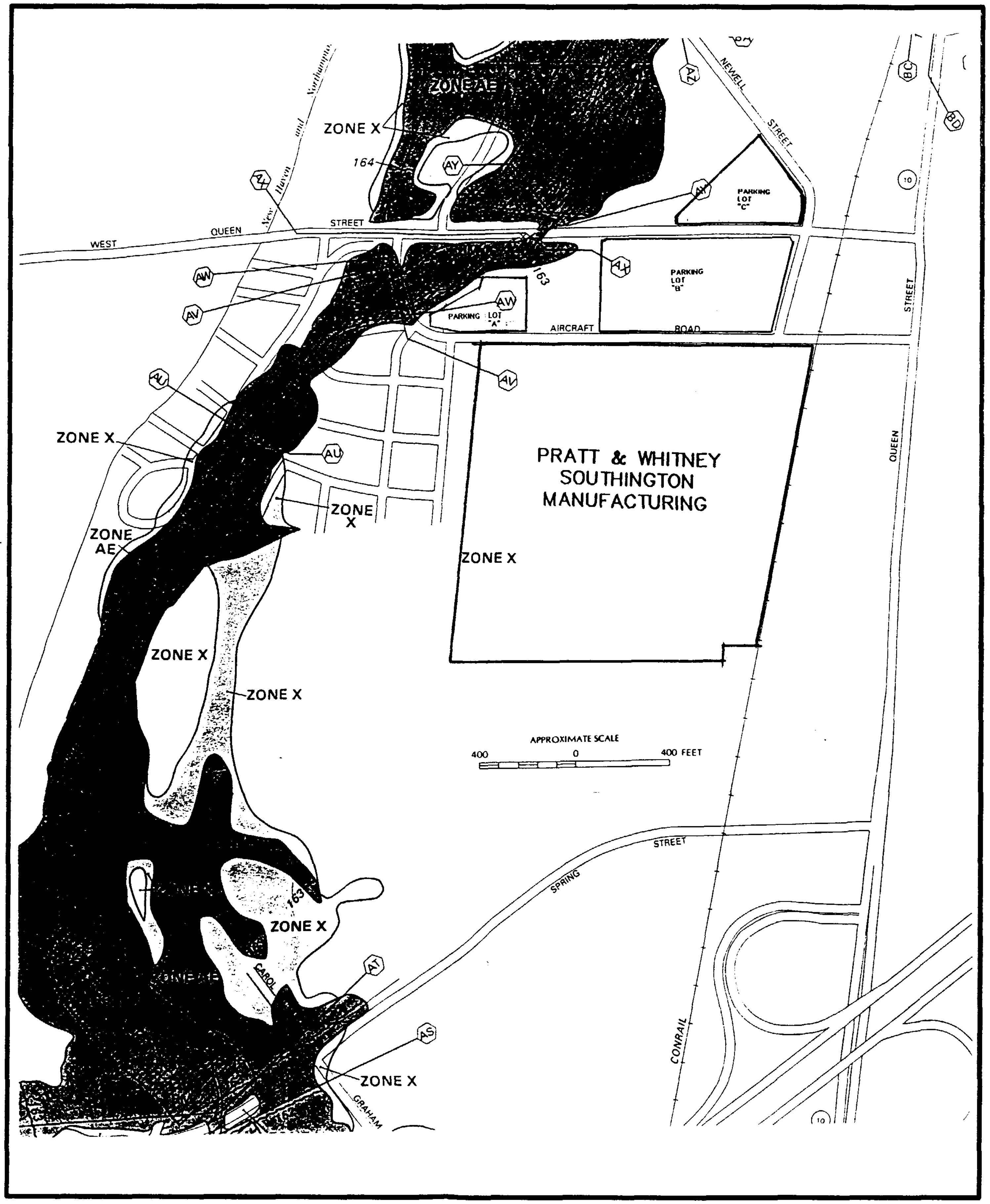
OTHER AREAS

ZONE X	Areas determined to be outside 500-year floodplain.
ZONE D	Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

	Floodplain boundary
	Floodway boundary
	Zone D boundary
	Property Line
	Boundary dividing special food hazard zones, and boundary dividing areas of different coastal base flood elevations within special Flood hazard zones.
513	Base flood elevation line; elevation in feet*
AX — AX	Cross section line
(EL 987)	Base flood elevation in feet where uniform Within Zone*
RM 7_x	Elevation reference mark
• M1.5	River mile

* Referenced to the National Geodetic Vertical Datum of 1929



MAP REFERENCE:
BASED ON INFORMATION OBTAINED FROM THE FLOOD INSURANCE RATE MAP FOR SOUTHINGTON, CONNECTICUT (COMMUNITY No. 090037-002-C, PANEL 2 OF 12) DATED JANUARY 17, 1990.

FIG. F-6

VOLUNTARY CORRECTIVE ACTION WORK PLAN
PRATT & WHITNEY SOUTHINGTON MFG. FACILITY

FLOODPLAIN MAP

Comm.No. 68VC601

Pratt & Whitney A United Technologies Company / LEA

VSW-FIGS (1)